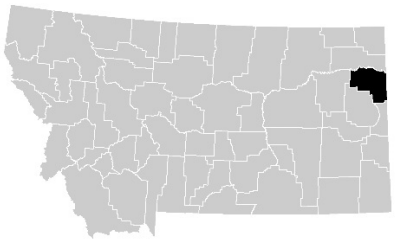
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



RICHLAND COUNTY, MONTANA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
FAIRVIEW, TOWN OF	300064
RICHLAND COUNTY, UNINCORPORATED AREAS	300165
SIDNEY, CITY OF	300065

FEMA

REVISED:

PRELIMINARY
2/22/2017

FLOOD INSURANCE STUDY NUMBER
30083CV000B

Version Number 2.3.3.0

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Exhibits

Flood Profiles	Panel
Lone Tree Creek	01 P
Missouri River	02-03 P
Yellowstone River	05-25 P

Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT
RICHLAND COUNTY, MONTANA

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal

Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Richland County, Montana.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Fairview, Town of	300064	10100004	30083C0835D	
Richland County, Unincorporated Areas	300165	10060002 10100004 10060005	30083C0025C 30083C0050C 30083C0075C 30083C0100C 30083C0125C 30083C0150C 30083C0175C	

Table 1: Listing of NFIP Jurisdictions - continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Richland County, Unincorporated Areas	300165	10060002 10100004 10060005	30083C0200C 30083C0225C 30083C0250C 30083C0275C 30083C0300C 30083C0325C 30083C0350C 30083C0375C[1] 30083C0400C[1] 30083C0425C[1] 30083C0450C[1] 30083C0475C[1] 30083C0500C[1] 30083C0525C 30083C0550C 30083C0575C 30083C0600C 30083C0625C[1] 30083C0650C[1] 30083C0675C[1] 30083C0700C[1] 30083C0725C[1] 30083C0750C[1] 30083C0775C[1] 30083C0800C 30083C0825C 30083C0830D 30083C0835D 30083C0840D 30083C0845D 30083C0875C[1] 30083C0900C[1] 30083C0925C[1] 30083C0950C[1] 30083C0975C[1] 30083C1000C[1] 30083C1025C[1] 30083C1050C 30083C1055D 30083C1060D 30083C1065D	

Table 1: Listing of NFIP Jurisdictions - continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Richland County, Unincorporated Areas	300165	10060002 10100004 10060005	30083C1065D 30083C1070D 30083C1080D 30083C1085D 30083C1090D 30083C1095D 30083C1125C[1] 30083C1150C[1] 30083C1175C[1] 30083C1200C 30083C1225C 30083C1235D 30083C1245D 30083C1250D 30083C1255D 30083C1260D 30083C1265D 30083C1270D 30083C1300C 30083C1325C[1] 30083C1345D 30083C1350D 30083C1355D 30083C1360D 30083C1365D 30083C1370D 30083C1400C 30083C1425C 30083C1450C[1] 30083C1455D 30083C1460D 30083C1475D[1] 30083C1500C[1] 30083C1525C[1]	
Sidney, City of	300065	10100004	30083C1055D 30083C1060D	

[1] Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 31, "Map Repositories," within this FIS Report.

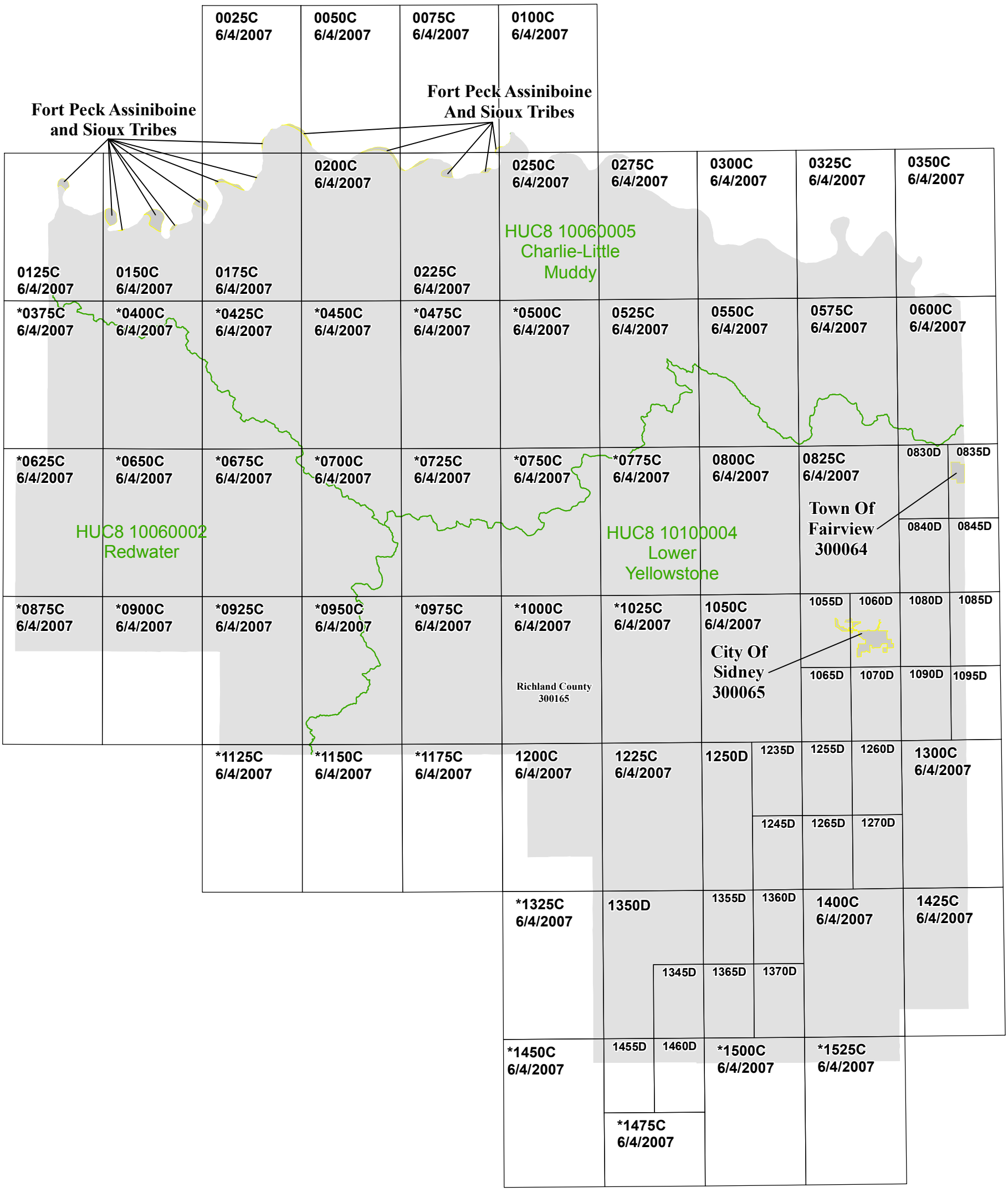
- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial Countywide FIS Report for Richland County became effective on June 4, 2007. Refer to Table 28 for information about subsequent revisions to the FIRMs.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Richland County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, watershed boundaries, and USGS HUC-8 codes.

Figure 1: FIRM Index



ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before [most recent FIRM panel date].

N

1 inch = 6 miles

Miles
0 6 12

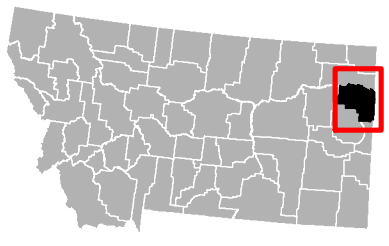
Map Projection:
UTM Zone 13 N
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

*PANEL NOT PRINTED - AREA IN ZONE D



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

RICHLAND COUNTY, MONTANA and Incorporated Areas

PANELS PRINTED:
0025, 0050, 0075, 0100, 0125, 0150, 0175, 0200, 0225, 0250, 0275, 0300, 0325, 0350, 0525, 0550, 0575, 0600, 0800, 0825, 0830, 0835, 0840, 0845, 1050, 1060, 1065, 1070, 1080, 1085, 1090, 1095, 1200, 1225, 1235, 1245, 1250, 1255, 1260, 1265, 1270, 1300, 1345, 1350, 1355, 1360, 1365, 1370, 1400, 1425, 1455, 1460

PRELIMINARY
2/22/2017

FEMA

MAP NUMBER
30083CIND0B
MAP REVISED

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 28 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

Figure 2. FIRM Notes to Users

PROJECTION INFORMATION: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 13N, Western Hemisphere**.** The horizontal datum was the North American Datum of 1983, GRS1980 spheroid**.** Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988**,** visit the National Geodetic Survey website at www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 31 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by National Flood Hazard Layer (1/23/2008), and the USDA National Agricultural Imagery Program (2015). For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Richland County, Montana, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 28 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.
ATTENTION: The corporate limits shown are based on the best information available at the time of publication of this FIRM Index. As such, they may be more current than those shown on FIRM panels issued before [effective date TBD].

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public

Figure 2. FIRM Notes to Users

awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Richland County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3: Map Legend for FIRM

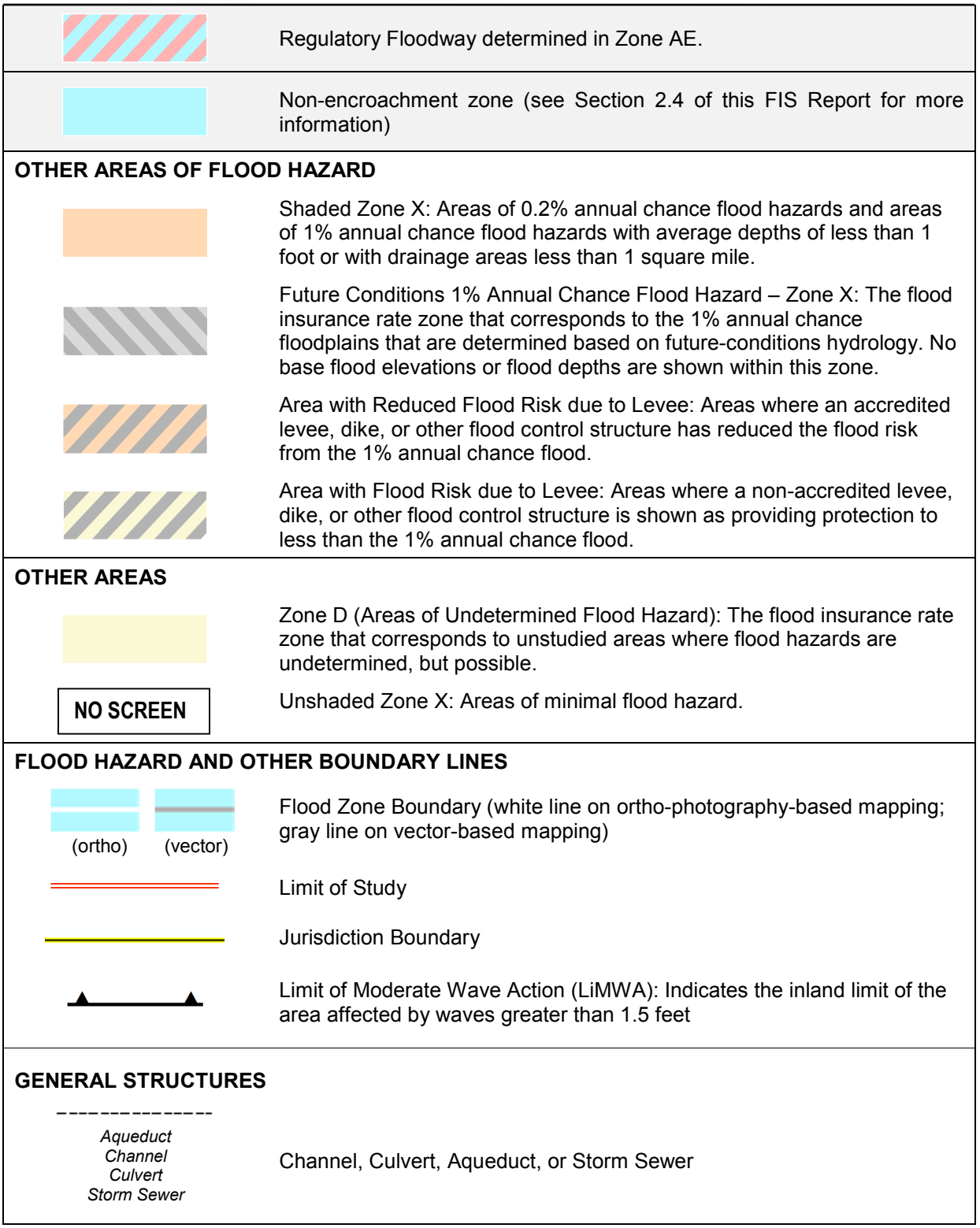


Figure 3: Map Legend for FIRM

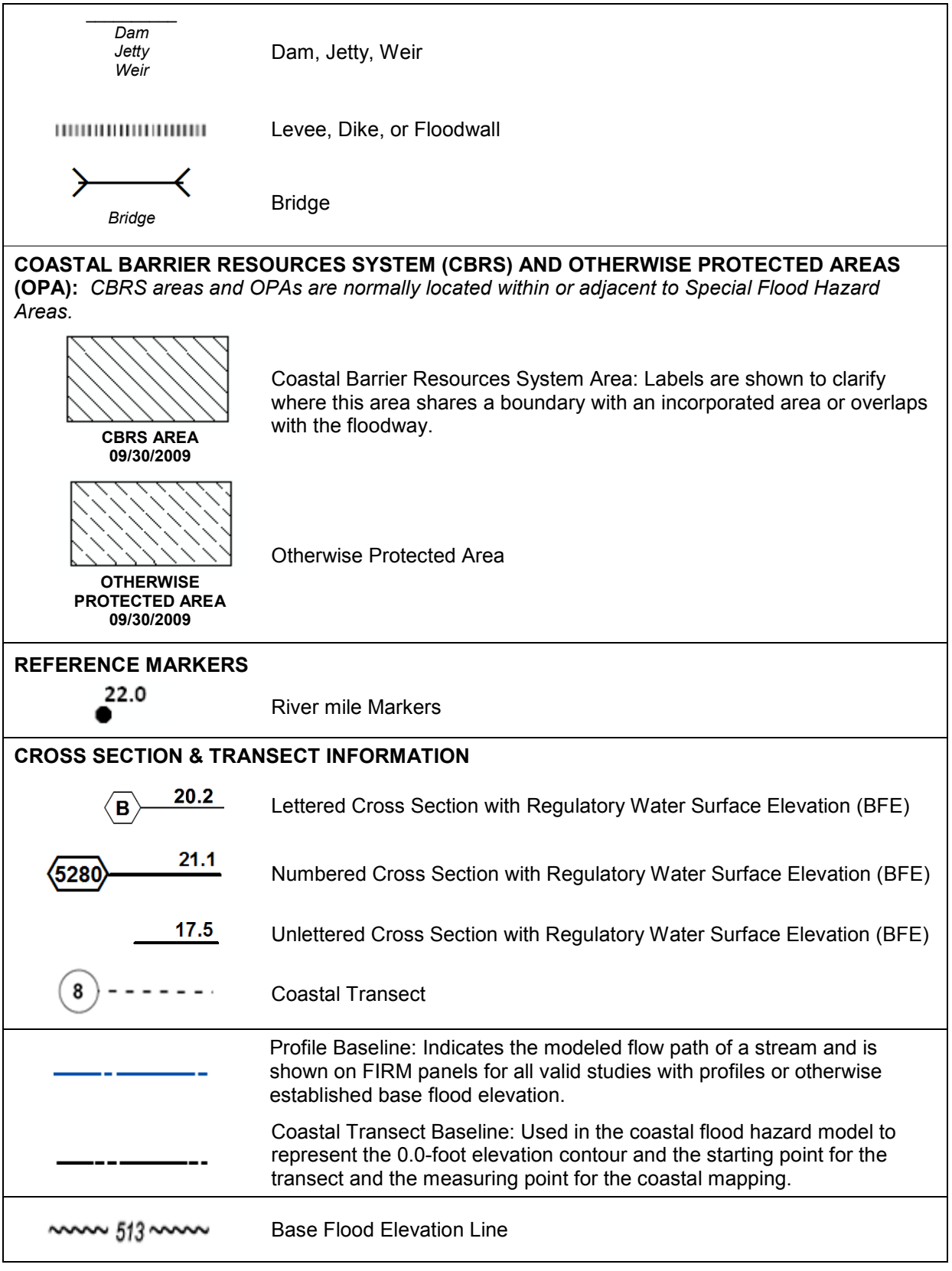
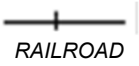


Figure 3: Map Legend for FIRM

ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway
	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
 *RAILROAD*	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}$E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Richland County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 23), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Richland County, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 13. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Lone Tree Creek	Sidney, City of; Richland County, Unincorporated Areas	Approximately 2,600 feet downstream of County Road 351	Approximately 2,100 feet upstream of Airport Road	10100004	4.09		Y	AE	1984
Missouri River	Richland County, Unincorporated Areas	Approximately 43,000 feet downstream of Confluence with Big Muddy Creek in Town of Culvertson	Approximately 2,600 feet downstream of County Road 351	1006005	62		Y	AE	1986
Yellowstone River	Richland County, Unincorporated Areas	At the eastern Richland County boundary	Approximately 1,800 feet upstream of the Richland County boundary	10100004	50.3		Y	AE	2016

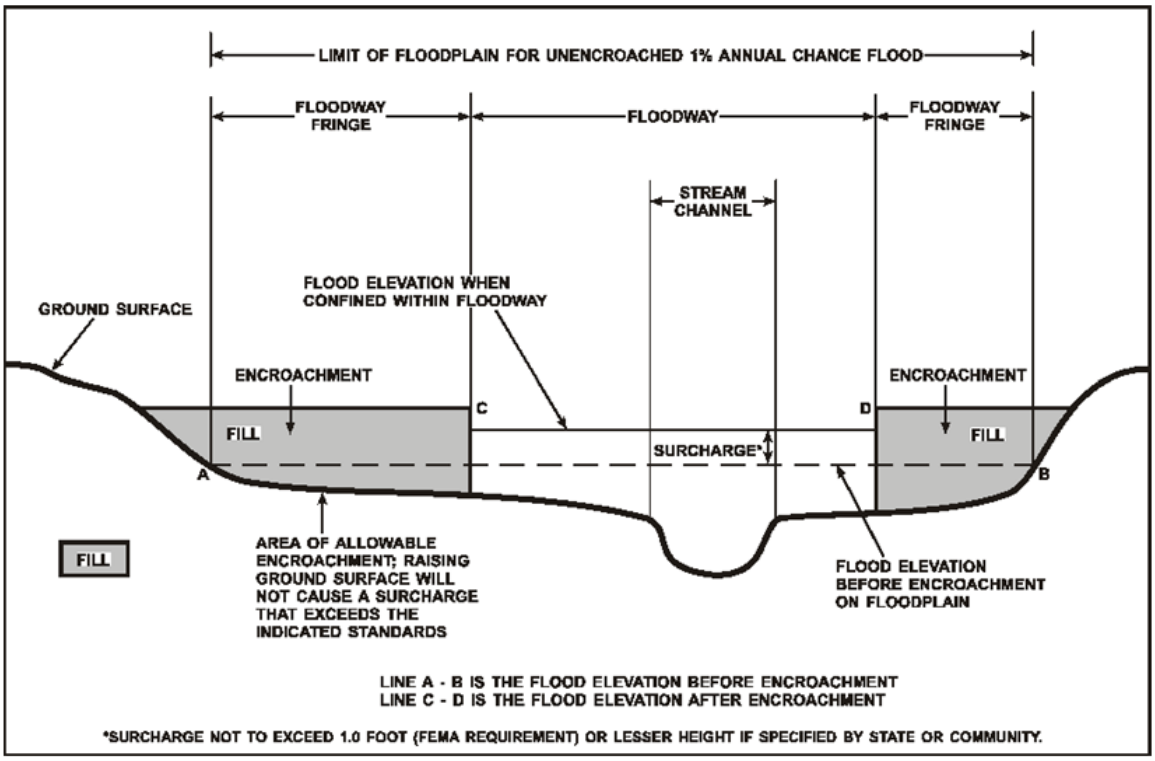
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. Regulations for Montana require communities in Richland County to limit increases caused by encroachment to 0.5 foot and several communities have adopted additional restrictions. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 24, “Floodway Data.”

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and 1% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

Figure 5: Wave Runup Transect Schematic

[Not Applicable to this Flood Risk Project]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

Figure 6: Coastal Transect Schematic

[Not Applicable to this Flood Risk Project]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Richland County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Fairview, Town of	A, X
Richland County, Unincorporated Areas	A, AE, D, X
Sidney, City of	AE, X

3.2 Coastal Barrier Resources System

This section is not applicable to this Flood Risk Project.

Table 4: Coastal Barrier Resources System Information

[Not Applicable to this Flood Risk Project]

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 5 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 5: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Charlie-Little Muddy	10060005	Missouri River	Affecting the northern portion of Richland County that is drained by the Missouri River and tributaries	Not Available
Lower Yellowstone	10100004	Yellowstone River	Largest watershed in Richland County encompassing the entire reach of the Yellowstone River within the county, affecting the eastern portion of the county.	Not Available

Table 5: Basin Characteristics - continued

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Redwater	10060002	East Redwater Creek	Smallest watershed in Richland County encompassing part of the western portion primarily drained by East Redwater Creek and tributaries.	Not Available

4.2 Principal Flood Problems

Table 6 contains a description of the principal flood problems that have been noted for Richland County by flooding source.

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
Lone Tree Creek	Major flooding occurred along Lone Tree Creek in March 1951 and March 1972. On March 21, 1951, the Vaux Dams, located upstream of the City of Sidney, failed, causing extensive flooding downstream. A combination of high flows and ice caused the collapse of a bridge located across the spillway, resulting in reduction in spillway capacity and overtopping of the dams. Inflow to the upper Vaux Dam was estimated to be approximately 2,000 cubic feet per second (cfs), an estimated recurrence interval of 20 years (Morrison-Maierle, Inc.1980).
Miscellaneous flooding sources within Richland County	On March 12, 1972, debris carried by high runoff clogged the culvert under County Route 488, causing extensive flooding in South Sidney. Ice jams have been a problem in Richland County; however, the flooding at County Route 488 and 22nd Avenue Northwest apparently resulted from constrictive hydraulic structures. County Route 488 now has a bridge instead of a culvert. The discharge of Lone Tree Creek during this flood is unknown (Sidney Herald 1972). On March 14, 1972 flooding caused damage to the 22nd Avenue Northwest Bridge, making it impassable. The flooding was reported to be the result of warm temperatures and melting snow.

Table 7 contains information about historic flood elevations in the communities within Richland County.

Table 7: Historic Flooding Elevations

[Not Applicable to this Flood Risk Project]

4.3 Non-Levee Flood Protection Measures

Table 8 contains information about non-levee flood protection measures within Richland County such as dams, jetties, and or dikes.

Table 8: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Lone Tree Creek	N/A	Dam	Various locations	Limited flood protection
Lone Tree Creek	Vaux Reservoir No. 1	Reservoir	Upstream of Confluence with Brorson Creek	Vaux Reservoirs combined flood storage of 1,010 acre-feet
Lone Tree Creek	Vaux Reservoir No. 2	Reservoir	Upstream of Confluence with Brorson Creek	Vaux Reservoirs combined flood storage of 1,010 acre-feet
Missouri River	Fort Peck Dam	Reservoir	Fort Peck Indian Reservation	Greatly reduces flood hazard

4.4 Levees

This section is not applicable to this Flood Risk Project.

Table 9: Levees

[Not Applicable to this Flood Risk Project]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 27, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 10. Stream gage information is provided in Table 12.

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Lone Tree Creek	At Sidney	97.0	1,540	*	3,170	4,050	*	6,800
Missouri River	Below Jct. Poplar Creek	**	40,000	*	77,300	102,300	*	193,500
Missouri River	Above Jct. Big Muddy Creek	**	40,700	*	78,800	104,700	*	199,000
Missouri River	Below Jct. Big Muddy Creek	**	43,300	*	86,400	117,000	*	227,600
Yellowstone River	At the confluence with the Missouri River	68,407	102,000	123,000	139,000	154,000	*	190,000

*Not calculated for this Flood Risk Project

**Data Not Available

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 11: Summary of Non-Coastal Stillwater Elevations

[Not Applicable to this Flood Risk Project]

Table 12: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Yellowstone River	06329500	USGS	Yellowstone River near Sidney, Montana	68,407	1911-1931	1934-2014

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. The blockage of bridge or culvert waterway openings during a period of storm water runoff could result in the flooding of areas outside those within the flood delineation lines.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 24, “Floodway Data.”

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 13. Roughness coefficients are provided in Table 14. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 13: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Lone Tree Creek	Approximately 2,600 feet downstream of County Road 351	Approximately 2,100 feet upstream of Airport Road	Peak discharges were computed using U.S. Geological Survey (USGS) Open-File Report 81-917	USACE HEC-2 step backwater (USACE 1982)	May 1984	AE w/ Floodway	Revised Techniques for Estimating Magnitude and Frequency of Floods in Montana (USGS 1981)
Missouri River	Approximately 43,000 feet downstream of Confluence with Big Muddy Creek in Town of Culvertson	Approximately 2,600 feet downstream of County Road 351	USACE Flood Hazard Report, Omaha District	USACE Flood Hazard Report, Omaha District	August 1986	AE w/ Floodway	HEC-RAS
Yellowstone River	At the eastern Richland County boundary	Approximately 1,800 feet upstream of the Richland County boundary	USGS PeakFQ Version 7.1	HEC-RAS Version 4.1.0	March 2016	AE w/ Floodway	

Table 14: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Lone Tree Creek	0.050	0.050-0.100
Missouri River	0.024	0.060
Yellowstone River	0.028-0.100	0.028-0.100

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

Table 15: Summary of Coastal Analyses

[Not Applicable to this Flood Risk Project]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas

[Not Applicable to this Flood Risk Project]

Table 16: Tide Gage Analysis Specifics

[Not Applicable to this Flood Risk Project]

5.3.2 Waves

This section is not applicable to this Flood Risk Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Coastal Transect Parameters

[Not Applicable to this Flood Risk Project]

Figure 9: Transect Location Map

[Not applicable to this Flood Risk Project]

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 18: Summary of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

Table 19: Results of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey (NGS) at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for Richland County are provided in Table 21.

Table 20: Countywide Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

Table 21: Stream-Based Vertical Datum Conversion

Flooding Source	Conversion from NGVD29 to NAVD88 (feet)
Average Conversion for entire County	+1.8
Lone Tree Creek	+1.7

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM Database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Base map information shown on the FIRM was derived from the sources described in Table 22.

Table 22: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Digital Orthophoto	USDA/NAIP	2015	1-meter	Orthophotography, Base Index
Base map files	Montana State Library	2015	N/A	Political areas, base index, Public Land Survey Systems
National Flood Hazard Layer	FEMA	1/23/2008	N/A	Political areas, Public Land Survey Systems, Transportation lines, waterlines, FIRM panel
Base map files	Richland County Public Works Division	N/A	N/A	Transportation lines, waterlines, FIRM panel

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 24, “Floodway Data.”

Certain flooding sources may have been studied that do not have published BFEs on the FIRMs, or for which there is a need to report the 1% annual chance flood elevations at selected cross sections because a published Flood Profile does not exist in this FIS Report. These streams may have also been studied using methods to determine non-encroachment zones rather than floodways. For these flooding sources, the 1% annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23. All topographic data used for modeling or mapping has been converted as necessary to NAVD88.

Table 23: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_z$	$Accuracy_z$	Citation
Richland County, Unincorporated Areas	Yellowstone River	LiDAR	1.4 meter resolution	2 feet	*	*	Woolpert 2012
Richland County, Unincorporated Areas	Yellowstone River	Structure Field Survey	*	*	*	*	USGS 2007
Sidney, City of; Richland County, Unincorporated Areas	Lone Tree Creek	Ground Survey, cross sections for backwater	*	*	*	*	HKM Associates August 1983, February 1984
Richland County, Unincorporated Areas	Lone Tree Creek	Aerial Photography	1:4,800	*	*	*	Horizons, Inc 1981
Richland County, Unincorporated Areas	Missouri River	Aerial Photography	1:4,800	*	*	*	Horizons, Inc 1981
Sidney, City of; Richland County, Unincorporated Areas	Lone Tree Creek	USGS	*	*	*	*	USGS 1966
Richland County, Unincorporated Areas	Missouri River	USGS	1:24,000	10 ft	*	*	USGS 1966

*Data Not Available

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in areas of ponding, and other areas with static base flood elevations.

LOCATION		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (**FEET**)	SECTION AREA (**SQ. FEET**)	MEAN VELOCITY (**FEET/ SEC**)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A-K[2]								
L	12,080	550	1,932	2.1	1,939.6	1,939.6	1,939.6	0.0
M	12,570	97	425	9.5	1,939.9	1,939.9	1,940.4	0.5
N	12,760	240	1,200	3.4	1,942.8	1,942.8	1,943.2	0.4
O	13,340	180	841	4.8	1,944.1	1,944.1	1,944.4	0.3
P	13,890	85	704	5.8	1,945.4	1,945.4	1,945.9	0.5
Q	14,030	95	837	5.1	1,946.4	1,946.4	1,946.7	0.3
R	14,410	85	527	7.7	1,947.2	1,947.2	1,947.6	0.4
S	14,740	146	757	5.4	1,949.5	1,949.5	1,949.9	0.4
T	16,140	195	900	4.5	1,954.9	1,954.9	1,955.4	0.5
U	17,490	310	1,302	3.1	1,960.6	1,960.6	1,961.0	0.4
V	17,710	235	1,077	3.8	1,961.6	1,961.6	1,962.1	0.5
W	17,810	64	348	11.6	1,962.5	1,962.5	1,963.0	0.5
X	17,950	232	1,910	2.1	1,965.6	1,965.6	1,966.0	0.4
Y	18,830	480	3,937	1.0	1,965.8	1,965.8	1,966.3	0.5
Z	19,440	130	745	5.5	1,965.9	1,965.9	1,966.4	0.5
AA	19,565	120	617	6.6	1,966.3	1,966.3	1,966.5	0.3
AB	20,805	350	1,404	2.9	1,971.6	1,971.6	1,972.0	0.4
AC	21,605	152	500	8.1	1,978.4	1,978.4	1,978.6	0.2

[1] Feet above Limit of Study

[2] Data not available

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

LONE TREE CREEK

LOCATION		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (**FEET**)	SECTION AREA (**SQ. FEET**)	MEAN VELOCITY (**FEET/ SEC**)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0	2,593	30,426	6.2	1,909.70	1,909.70	1,910.20	0.5
B	11,600	2,440/1,440[2]	36,050	4.2	1,911.50	1,911.50	1,912.00	0.5
C	43,333	2,435/786[2]	23,033	5.2	1,914.80	1,914.80	1,915.30	0.5
D	80,733	2,249/1,050[2]	22,497	5.7	1,920.90	1,920.90	1,921.40	0.5
E	103,133	1,649/449[2]	23,186	4.6	1,924.80	1,924.80	1,925.30	0.5
F	127,533	3,049/1,199[2]	23,540	5.8	1,928.80	1,928.80	1,929.10	0.3
G	156,933	3,349	21,753	7.5	1,935.00	1,935.00	1,935.20	0.2
H	200,733	3,750	37,806	5.2	1,943.30	1,943.30	1,943.50	0.2
I	261,251	1,324	23,678	4.3	1,952.30	1,952.30	1,952.80	0.5

[1] Stream distance in feet above Town of Culbertson, 41,000 ft down-stream of Confluence with Big Muddy Creek

[2] Total width\width within Richland County

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

MISSOURI RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	2,839	1,308	33,198	4.6	1,892.0	1,892.0	1,892.5	0.5
B	4,749	2,655	43,928	3.5	1,892.3	1,892.3	1,892.8	0.5
C	7,130	2,613	38,409	4.0	1,892.6	1,892.6	1,893.0	0.4
D	10,159	1,532	23,905	6.4	1,893.1	1,893.1	1,893.5	0.4
E	13,324	3,406	40,643	3.8	1,894.8	1,894.8	1,895.2	0.4
F	17,321	6,332	54,782	2.8	1,895.2	1,895.2	1,895.7	0.5
G	19,307	4,458	61,239	2.5	1,895.6	1,895.6	1,896.1	0.5
H	21,313	4,485[2]	52,413	2.9	1,895.9	1,895.9	1,896.3	0.4
I	23,319	4,388[2]	54,369	2.8	1,896.2	1,896.2	1,896.6	0.4
J	25,271	3,896[2]	43,598	3.5	1,896.3	1,896.3	1,896.7	0.4
K	27,240	3,680[2]	50,411	3.1	1,897.0	1,897.0	1,897.5	0.5
L	29,208	3,825[2]	49,082	3.1	1,897.6	1,897.6	1,898.1	0.5
M	31,179	3,023[2]	49,009	3.1	1,898.1	1,898.1	1,898.6	0.5
N	32,926	2,988[2]	45,654	3.4	1,898.3	1,898.3	1,898.7	0.4
O	34,856	1,853	35,480	4.3	1,898.4	1,898.4	1,898.9	0.5
P	37,174	3,160	43,944	3.5	1,898.7	1,898.7	1,899.2	0.5
Q	38,947	4,631	52,400	2.9	1,899.0	1,899.0	1,899.5	0.5
R	40,899	5,969	54,218	2.8	1,899.3	1,899.3	1,899.7	0.4
S	42,877	4,466	49,087	3.1	1,899.5	1,899.5	1,900.0	0.5
T	44,861	2,079	35,342	4.4	1,899.8	1,899.8	1,900.2	0.4
U	46,511	1,382	33,879	4.5	1,899.9	1,899.9	1,900.4	0.5

[1] Feet above limit of study

[2] Width extends beyond county boundary

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
V	48,285	849	20,254	7.6	1,900.0	1,900.0	1,900.5	0.5
W	50,272	1,156	25,409	6.1	1,901.2	1,901.2	1,901.6	0.4
X	52,271	2,201	39,108	3.9	1,901.8	1,901.8	1,902.3	0.5
Y	54,291	3,032	39,147	3.9	1,902.1	1,902.1	1,902.6	0.5
Z	56,241	3,445	43,710	3.5	1,902.5	1,902.5	1,903.0	0.5
AA	58,127	3,903	46,477	3.3	1,902.8	1,902.8	1,903.3	0.5
AB	60,127	5,823	54,569	2.8	1,903.1	1,903.1	1,903.6	0.5
AC	61,988	6,466	63,644	2.4	1,903.5	1,903.5	1,904.0	0.5
AD	64,189	6,466	65,841	2.3	1,903.7	1,903.7	1,904.2	0.5
AE	66,336	4,042	45,526	3.4	1,903.9	1,903.9	1,904.4	0.5
AF	68,256	1,624	26,849	5.7	1,904.1	1,904.1	1,904.6	0.5
AG	70,039	3,290	49,641	3.1	1,905.1	1,905.1	1,905.5	0.4
AH	72,044	3,973	49,131	3.1	1,905.5	1,905.5	1,906.0	0.5
AI	73,997	4,080	44,062	3.5	1,905.9	1,905.9	1,906.4	0.5
AJ	75,918	3,652	50,858	3.0	1,906.3	1,906.3	1,906.7	0.4
AK	77,888	3,921	51,499	3.0	1,906.6	1,906.6	1,907.1	0.5
AL	79,787	3,803	45,816	3.4	1,906.8	1,906.8	1,907.3	0.5
AM	81,851	2,219	29,570	5.2	1,907.2	1,907.2	1,907.7	0.5
AN	83,304	1,945	26,824	5.7	1,907.7	1,907.7	1,908.2	0.5
AO	84,597	1,456	23,840	6.5	1,908.2	1,908.2	1,908.7	0.5
AP	85,448	1,297	22,409	6.9	1,908.9	1,908.9	1,909.3	0.4

[1] Feet above limit of study

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AQ	86,686	2,406	33,287	4.6	1,909.9	1,909.9	1,910.4	0.5
AR	88,711	3,734	50,196	3.1	1,910.4	1,910.4	1,910.9	0.5
AS	90,674	3,285	42,696	3.6	1,910.6	1,910.6	1,911.1	0.5
AT	92,635	4,313	48,179	3.2	1,911.1	1,911.1	1,911.6	0.5
AU	94,548	4,560	47,063	3.3	1,911.5	1,911.5	1,912.0	0.5
AV	96,497	2,724	40,779	3.8	1,912.0	1,912.0	1,912.4	0.4
AW	98,645	4,922	54,185	2.8	1,912.3	1,912.3	1,912.8	0.5
AX	100,587	4,023	54,805	2.8	1,912.5	1,912.5	1,913.0	0.5
AY	102,622	3,914	40,746	3.8	1,912.8	1,912.8	1,913.2	0.4
AZ	104,663	5,475	43,866	3.5	1,913.4	1,913.4	1,913.8	0.4
BA	106,675	6,080	44,777	3.4	1,913.9	1,913.9	1,914.3	0.4
BB	108,661	6,772	50,557	3.0	1,914.4	1,914.4	1,914.8	0.4
BC	110,899	6,400	43,526	3.5	1,914.8	1,914.8	1,915.2	0.4
BD	112,861	2,379	22,520	6.8	1,915.2	1,915.2	1,915.6	0.4
BE	114,918	2,353	30,697	5.0	1,916.4	1,916.4	1,916.9	0.5
BF	116,788	3,181	33,200	4.6	1,917.2	1,917.2	1,917.7	0.5
BG	119,045	4,042	49,799	3.1	1,918.0	1,918.0	1,918.5	0.5
BH	120,136	3,619	53,641	2.9	1,918.2	1,918.2	1,918.7	0.5
BI	122,063	4,146	47,020	3.3	1,918.5	1,918.5	1,919.0	0.5
BJ	123,915	7,211	79,324	1.9	1,919.0	1,919.0	1,919.4	0.4
BK	126,038	8,592	61,744	2.5	1,919.2	1,919.2	1,919.7	0.5

[1] Feet above limit of study

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BL	128,010	8,339	53,037	2.9	1,919.6	1,919.6	1,920.0	0.4
BM	129,977	9,452	53,301	2.9	1,920.0	1,920.0	1,920.5	0.5
BN	131,950	9,585	51,821	3.0	1,920.5	1,920.5	1,920.9	0.4
BO	133,926	9,464	54,334	2.8	1,921.2	1,921.2	1,921.6	0.4
BP	136,322	6,397	43,940	3.5	1,921.8	1,921.8	1,922.2	0.4
BQ	138,351	5,075	41,385	3.7	1,922.7	1,922.7	1,923.1	0.4
BR	140,299	5,327	42,039	3.7	1,923.5	1,923.5	1,923.9	0.4
BS	142,313	7,848	60,450	2.5	1,924.4	1,924.4	1,924.8	0.4
BT	144,326	9,437	65,285	2.4	1,924.9	1,924.9	1,925.3	0.4
BU	146,681	10,129	67,183	2.3	1,925.4	1,925.4	1,925.8	0.4
BV	149,051	9,456	67,333	2.3	1,926.1	1,926.1	1,926.5	0.4
BW	151,620	7,616	62,706	2.5	1,927.1	1,927.1	1,927.6	0.5
BX	153,218	5,433	43,911	3.5	1,927.6	1,927.6	1,928.1	0.5
BY	155,215	4,914	35,087	4.4	1,928.4	1,928.4	1,928.8	0.4
BZ	157,152	4,122	34,882	4.4	1,929.8	1,929.8	1,930.2	0.4
CA	159,111	3,779	34,032	4.5	1,930.4	1,930.4	1,930.9	0.5
CB	161,080	3,447	34,346	4.5	1,931.2	1,931.2	1,931.6	0.4
CC	162,937	3,299	31,954	4.8	1,932.0	1,932.0	1,932.3	0.3
CD	165,034	2,233	24,306	6.3	1,932.9	1,932.9	1,933.3	0.4
CE	166,991	3,522	25,321	6.1	1,933.5	1,933.5	1,933.9	0.4
CF	168,804	5,018	35,018	4.4	1,935.0	1,935.0	1,935.4	0.4

[1] Feet above limit of study

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CG	170,922	6,050	48,120	3.2	1,936.1	1,936.1	1,936.5	0.4
CH	172,886	6,485	57,089	2.7	1,936.7	1,936.7	1,937.2	0.5
CI	174,988	5,612	50,292	3.1	1,937.1	1,937.1	1,937.6	0.5
CJ	177,064	5,302	44,240	3.5	1,937.4	1,937.4	1,937.9	0.5
CK	178,932	5,760	39,793	3.9	1,937.9	1,937.9	1,938.4	0.5
CL	180,999	5,897	37,534	4.1	1,938.6	1,938.6	1,939.0	0.4
CM	182,608	5,824	35,782	4.3	1,938.9	1,938.9	1,939.4	0.5
CN	184,307	6,091	37,347	4.1	1,940.7	1,940.7	1,941.1	0.4
CO	186,561	9,340	70,070	2.2	1,941.8	1,941.8	1,942.2	0.4
CP	188,473	11,060	67,643	2.3	1,942.2	1,942.2	1,942.5	0.3
CQ	190,504	10,285	64,634	2.4	1,942.6	1,942.6	1,943.0	0.4
CR	192,807	8,562	51,402	3.0	1,943.0	1,943.0	1,943.3	0.3
CS	195,378	6,238	42,875	3.6	1,943.5	1,943.5	1,943.9	0.4
CT	197,189	7,139	46,965	3.3	1,944.3	1,944.3	1,944.7	0.4
CU	199,097	8,746	51,587	3.0	1,944.9	1,944.9	1,945.3	0.4
CV	201,066	7,996	47,692	3.3	1,945.6	1,945.6	1,946.0	0.4
CW	202,478	7,184	42,114	3.7	1,946.3	1,946.3	1,946.6	0.3
CX	204,477	4,711	31,677	4.9	1,947.8	1,947.8	1,948.0	0.2
CY	206,490	7,414	44,445	3.5	1,948.9	1,948.9	1,949.3	0.4
CZ	208,511	2,807	32,498	4.7	1,949.6	1,949.6	1,949.9	0.3
DA	210,476	2,934	25,479	6.0	1,950.2	1,950.2	1,950.6	0.4

[1] Feet above limit of study

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DB	212,410	3,214	20,943	7.4	1,951.5	1,951.5	1,951.8	0.3
DC	214,445	3,590	25,510	6.0	1,953.8	1,953.8	1,953.8	0.0
DD	216,339	3,199	23,735	6.5	1,954.6	1,954.6	1,954.8	0.2
DE	218,281	701	13,018	11.8	1,955.4	1,955.4	1,955.5	0.1
DF	220,340	1,671	23,601	6.5	1,958.7	1,958.7	1,959.0	0.3
DG	222,297	3,814	37,531	4.1	1,959.8	1,959.8	1,960.1	0.3
DH	224,267	4,264	36,022	4.3	1,960.3	1,960.3	1,960.6	0.3
DI	226,344	3,926	34,352	4.5	1,961.0	1,961.0	1,961.3	0.3
DJ	228,226	3,620	27,741	5.6	1,961.5	1,961.5	1,961.8	0.3
DK	230,213	4,376	32,967	4.7	1,962.8	1,962.8	1,963.2	0.4
DL	232,169	5,439	37,417	4.1	1,964.0	1,964.0	1,964.5	0.5
DM	233,978	6,193	40,587	3.8	1,964.8	1,964.8	1,965.3	0.5
DN	236,155	7,339	46,986	3.3	1,965.5	1,965.5	1,965.9	0.4
DO	238,069	7,249	51,731	3.0	1,965.9	1,965.9	1,966.3	0.4
DP	240,005	4,681	32,265	4.8	1,966.3	1,966.3	1,966.7	0.4
DQ	242,197	4,465	36,601	4.2	1,967.3	1,967.3	1,967.6	0.3
DR	244,324	3,592	29,807	5.2	1,967.9	1,967.9	1,968.2	0.3
DS	246,230	2,956	22,346	6.9	1,968.6	1,968.6	1,969.0	0.4
DT	248,131	3,427	26,813	5.7	1,970.4	1,970.4	1,970.8	0.4
DU	250,073	3,127	31,211	4.9	1,971.8	1,971.8	1,972.3	0.5
DV	251,429	3,020	33,524	4.6	1,972.5	1,972.5	1,972.9	0.4

[1] Feet above limit of study

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DW	253,146	3,909	27,755	5.5	1,973.4	1,973.4	1,973.7	0.3
DX	254,937	4,382	28,725	5.4	1,974.3	1,974.3	1,974.6	0.3
DY	256,667	5,460[2]	50,381	3.1	1,976.1	1,976.1	1,976.5	0.4
DZ	258,884	6,627[2]	52,792	2.9	1,976.7	1,976.7	1,977.0	0.3
EA	260,304	6,405[2]	49,446	3.1	1,976.9	1,976.9	1,977.3	0.4
EB	261,896	5,961[2]	46,473	3.3	1,977.3	1,977.3	1,977.6	0.3
EC	263,482	5,448[2]	42,721	3.6	1,977.6	1,977.6	1,977.9	0.3

[1] Feet above limit of study

[2] Width extends beyond county boundary

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

FLOODWAY DATA

YELLOWSTONE RIVER

Table 25: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not Applicable to this Flood Risk Project]

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this Flood Risk Project.

Table 26: Summary of Coastal Transect Mapping Considerations

[Not Applicable to this Flood Risk Project]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 31, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit www.fema.gov/floodplain-management/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/floodplain-management/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Richland County FIRM are listed in Table 27.

Table 27: Incorporated Letters of Map Change

Case Number	Effective Date	Flooding Source	FIRM Panel(s)
07-08-0006P	01/23/2008	Lone Tree Creek	30083C1055D 30083C1060D

6.5.4 Physical Map Revisions

A Physical Map Revisions (PMR) is an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Flood County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 28, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 28 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first FHBM. This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.
- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.
- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as PMRs of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Richland County FIRMs in countywide format was 06/04/2007.

Table 28: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Fairview, Town of	08/16/1974	08/16/1974	05/14/1976	05/15/1986	TBD
Richland County, Unincorporated Areas	01/31/1978	N/A	N/A	12/04/1985	TBD
Sidney, City of	05/24/1974	05/24/1974	12/05/1975	12/04/1985	TBD

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 29 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 29: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Lone Tree Creek	06/04/2007	HKM Associates	EMN-83-C-1188	May 1984	Sidney, City of; Richland County, Unincorporated Areas
Missouri River	06/04/2007	USACE, Omaha District	Flood Hazard Report	August 1986	Richland County, Unincorporated Areas

Table 29: Summary of Contracted Studies Included in this FIS Report - continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Yellowstone River	TBD	U.S. Army Corps of Engineers	*	2014	Richland County, Unincorporated Areas
Yellowstone River	[TBD]	Michael Baker International	WO-MB-139	March 2016	Richland County, Unincorporated Areas

*Data not available

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 30. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 30: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Fairview, Town of	06/04/2007	04/13/2006	CCO Meeting	FEMA, the community, and the study contractor
Richland County And Incorporated Areas	06/04/2007	04/13/2006	CCO Meeting	FEMA, the community, and the study contractor
Richland County Unincorporated Areas	12/04/1985	04/1983	CCO Meeting	FEMA, the community, and the study contractor
		01/22/1985	CCO Meeting	FEMA, the community, and the study contractor
Sidney, City of	12/04/1985	04/1983	CCO Meeting	FEMA, the community, and the study contractor
		01/22/1985	CCO Meeting	FEMA, the community, and the study contractor

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

The additional data that was used for this project includes the FIS Report and FIRM that were previously prepared for Richland County (FEMA 2007).

Table 31 is a list of the locations where FIRMs for Richland County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 31: Map Repositories

Community	Address	City	State	Zip Code
Fairview, Town of	City Hall 318 South Central Avenue	Fairview	Montana	59221
Richland County, Unincorporated Areas	Richland County Courthouse 201 West Main Street	Sidney	Montana	59270
Sidney, City of	City Hall 112 2nd Street Southeast	Sidney	Montana	59270

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM Databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 32.

Table 32 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 32: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library

Table 32: Additional Information - continued

NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov
FEMA Region VIII	Denver Federal Center Building 710, Box 25267 Denver, CO 80225-0267 (303) 235-4800
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Traci Sears, CFM MT Floodplain Mgmt. Program 1424 9th Ave. Helena, MT 59620-1601 406-444-6654 FAX 406-444-0533 tsears@mt.gov
State GIS Coordinator	Erin Fashoway Montana State Library EFashoway@mt.gov 406-444-9013

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 33 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 33: Bibliography and References

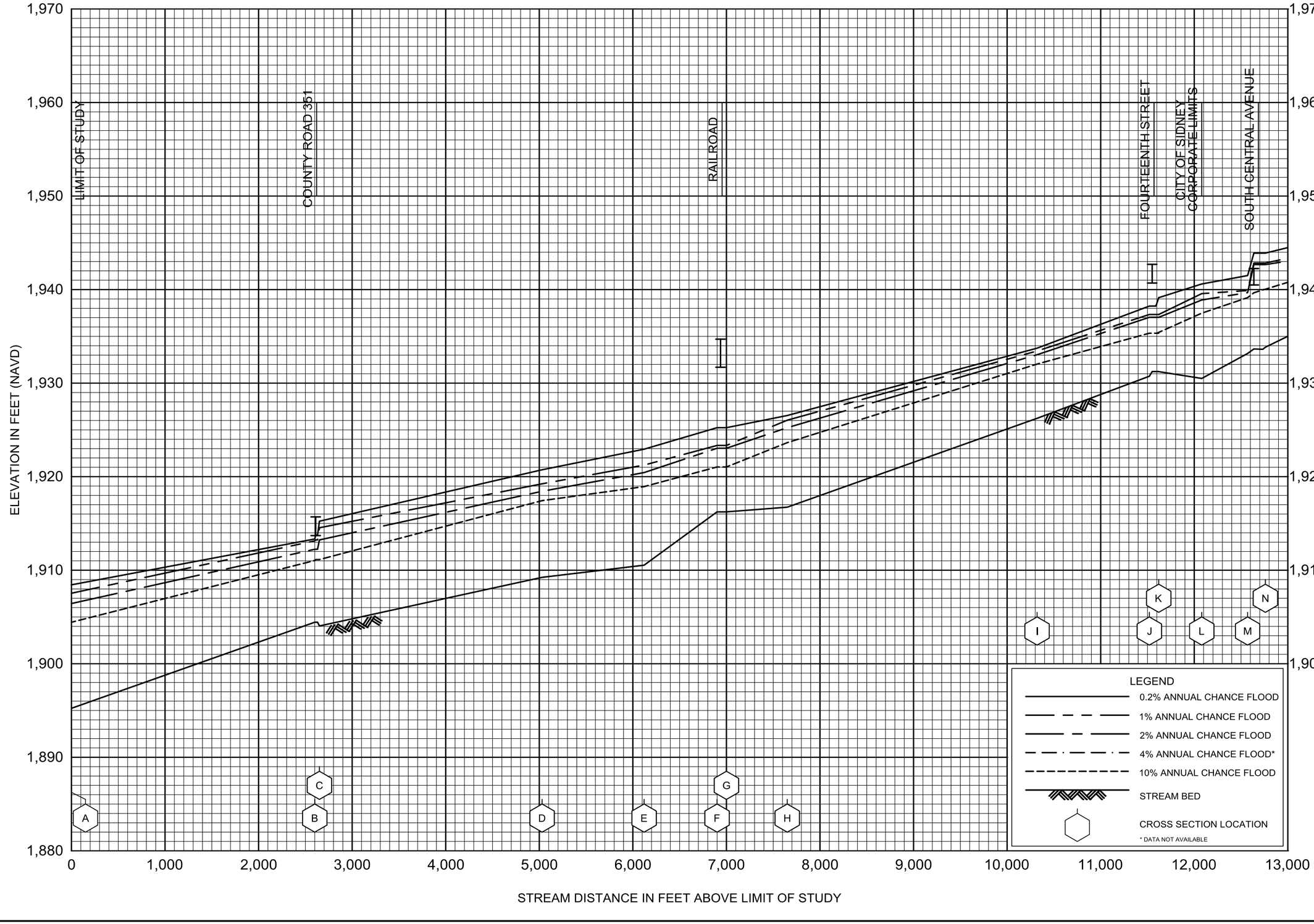
Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
FEMA 1985(a)	Federal Emergency Management Agency	*Flood Insurance Study, Fort Peck Assiniboine and Sioux Tribes, Montana*		Washington, D.C.	December 4, 1985	FEMA Flood Map Service Center msc.fema.gov
FEMA 1985(b)	Federal Emergency Management Agency	*Flood Insurance Study,City of Sidney, Richland County, Montana*		Washington, D.C.	December 4, 1985	FEMA Flood Map Service Center msc.fema.gov
FEMA 1985(c)	Federal Emergency Management Agency	*Flood Insurance Study, Richland County, Montana, and Unincorporated Areas*		Washington, D.C.	December 4, 1985	FEMA Flood Map Service Center msc.fema.gov
USACE 1986	U.S. Army Corps of Engineers, Omaha District, Engineering Division	*Flood Hazard Report, Existing Conditions, Missouri River, Fort Peck Dam to Garrison Dam, River Mile 1389.9 to 1770.90,*		Washington, D.C.	August 1986	
USACE 2014	U.S. Army Corps of Engineers	*Yellowstone River Corridor Study, Hydraulic Analysis, Modeling and Mapping Report: Omaha, Nebraska, 29 p*	Engineering Division, Hydrologic Engineering Branch	Omaha, Nebraska	2014	
Morrison-Maierle, Inc. 1980	Morrison-Maierle, Inc.	*Phase I Inspection Report National Dam Safety Program, Vaux #1 and Vaux #2 Dams, Sidney, Montana*		Sidney, Montana	February 1980	
Sidney Herald 1972	Sidney Herald	*"Lone Tree Floods Sidney" and "County Suffers Wounds"*	Sidney Herald	Sidney, Montana	March 15, 1972	

Table33: Bibliography and References - continued

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
HUD 1978	U.S. Department of Housing and Urban Development, Federal Insurance Administration	*Flood Hazard Boundary Map, Richland County, Montana, (Unincorporated Areas)*	Federal Insurance Administration	Washington, D.C.	January 31, 1978	
USGS 1981	U.S. Department of the Interior, Geological Survey	*Open-File Report 81-917, Revised Techniques for Estimating Magnitude and Frequency of Floods in Montana*	Charles Parrett and R.J. Onong	Reston, Virginia	September 1981	
USACE 1982	U.S. Army Corps of Engineers	*Generalized Computer Program, HEC-2 Water Surface Profiles*	Hydrologic Engineering Center	Davis, California	September 1982	
USACE 1998	U.S. Army Corps of Engineers	*HEC-RAS River Analysis System. Version 2.2*	Hydrologic Engineering Center	Davis, California	September 1998	
USACE 1991	U.S. Army Corps of Engineers	*HEC-2 Water-Surface Profiles. Version 4.6.2*	Hydrologic Engineering Center	Davis, California	May 1991	
USACE 2010a	U.S. Army Corps of Engineers	HEC-RAS River Analysis System, Version 4.1.0.	Hydrologic Engineering Center	Davis, California	January 2010.	
USACE 2012	U.S. Army Corps of Engineers	HEC-GeoRAS 10 for ArcGIS 10.0.	Hydrologic Engineering Center	Davis, California	May 2012	
USACE 2010b	U.S. Army Corps of Engineers	*HEC-RAS River Analysis System, Version 4.1.0, User's Manual*	Hydrologic Engineering Center	Davis, California	January 2010.	
FEMA	Federal Emergency Management Agency	*Knowledge Sharing Site*	Federal Emergency Management Agency			

Table33: Bibliography and References - continued

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
Woolpert 2012	Woolpert	*Yellowstone River Orthography Imagery and LiDAR*		Dayton, OH	July 2012	
USACE	U.S. Army Corps of Engineers	CORPSCON Datum Conversion Software. Version 6.0.	Topographic Engineering Center			
FEMA 2003	Federal Emergency Management Agency	Map Modernization, Guidelines and Specifications for Flood Hazard Mapping Partners. Appendix B: Guidance for Converting to the North American Vertical Datum of 1988	Federal Emergency Management Agency		April 2003	
USGS 1966	U.S. Department of the Interior, Geological Survey	7.5-Minute Series Topographic Maps. Scale 1:24.000. Contour Interval 10 feet: Sidney. Montana (1966); Sidney Northeast, Montana, North Dakota	U.S. Department of the Interior, Geological Survey	Reston, Virginia	1966	
Horizons, Inc. 1981	Horizons, Inc.	Aerial Photography Sidney, Montana; Scale 1:4.800	Horizons, Inc.		July 1981	
MT DNRC 2014	Montana Department of Natural Resources and Conservation	*Yellowstone River Corridor Study, Hydraulic Analysis, Modeling and Mapping Report*	U.S Army Corps of Engineers	Omaha, Nebraska	2014	
MT DNRC 2016	Montana Department of Natural Resources and Conservation	*Yellowstone River Floodplain Study in Richland County, Montana*	Michael Baker International		March 2016	
MT DNRC 2012	Montana Department of Natural Resources and Conservation	*Yellowstone River Orthography Imagery and LiDAR*	Woolpert		April 2012	



FLOOD PROFILES

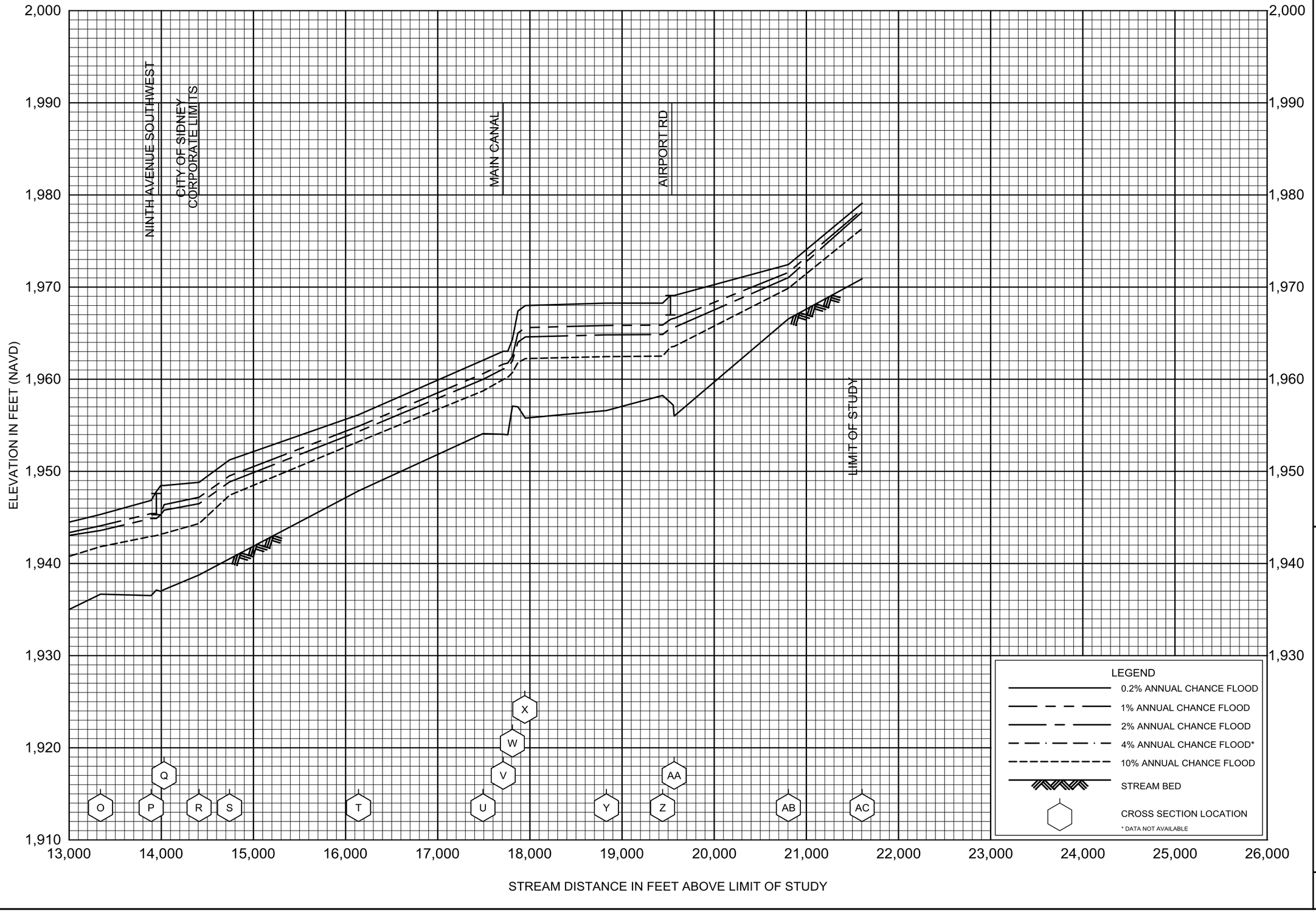
LONE TREE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

01P



FLOOD PROFILES

LONE TREE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

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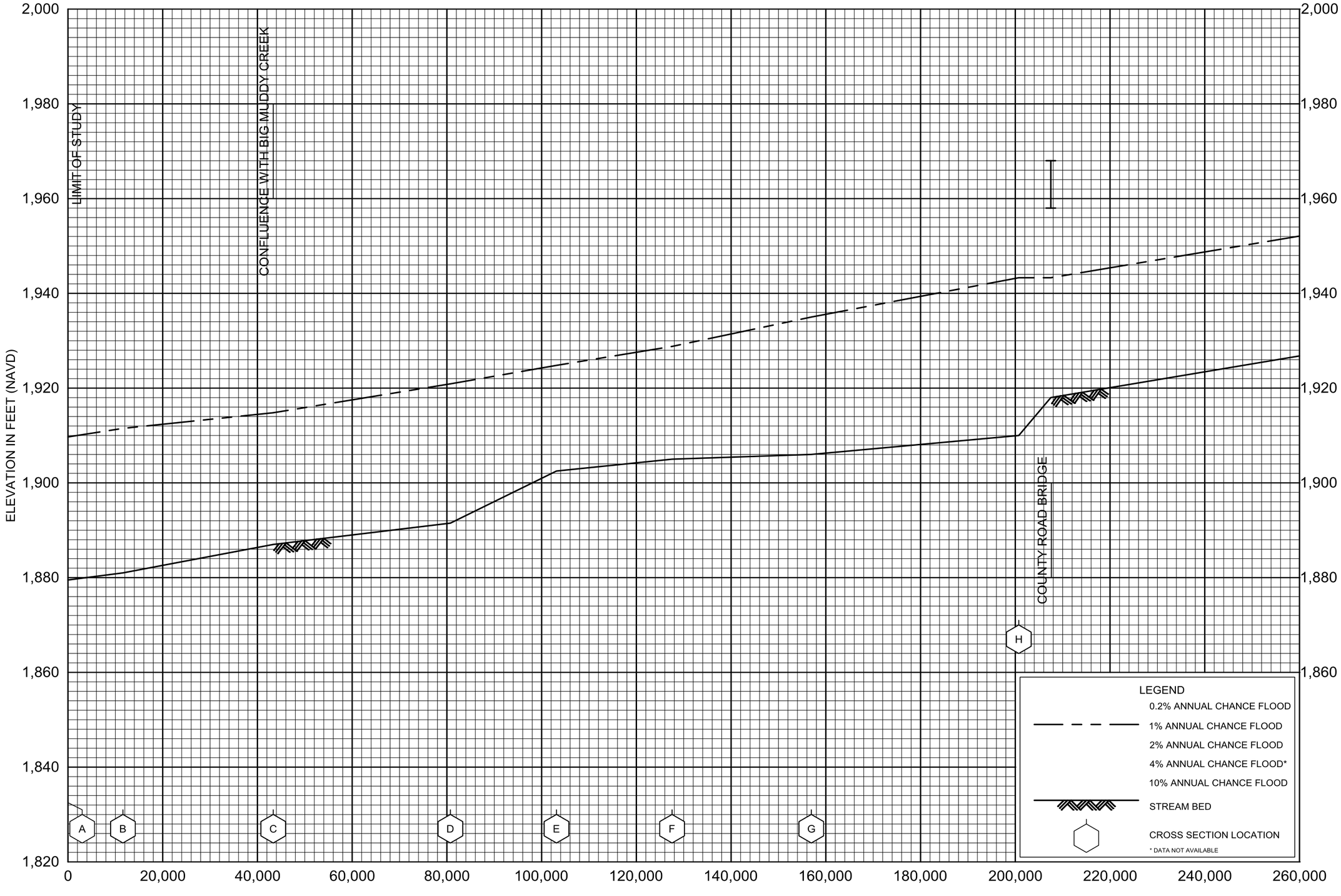

FLOOD PROFILES

MISSOURI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

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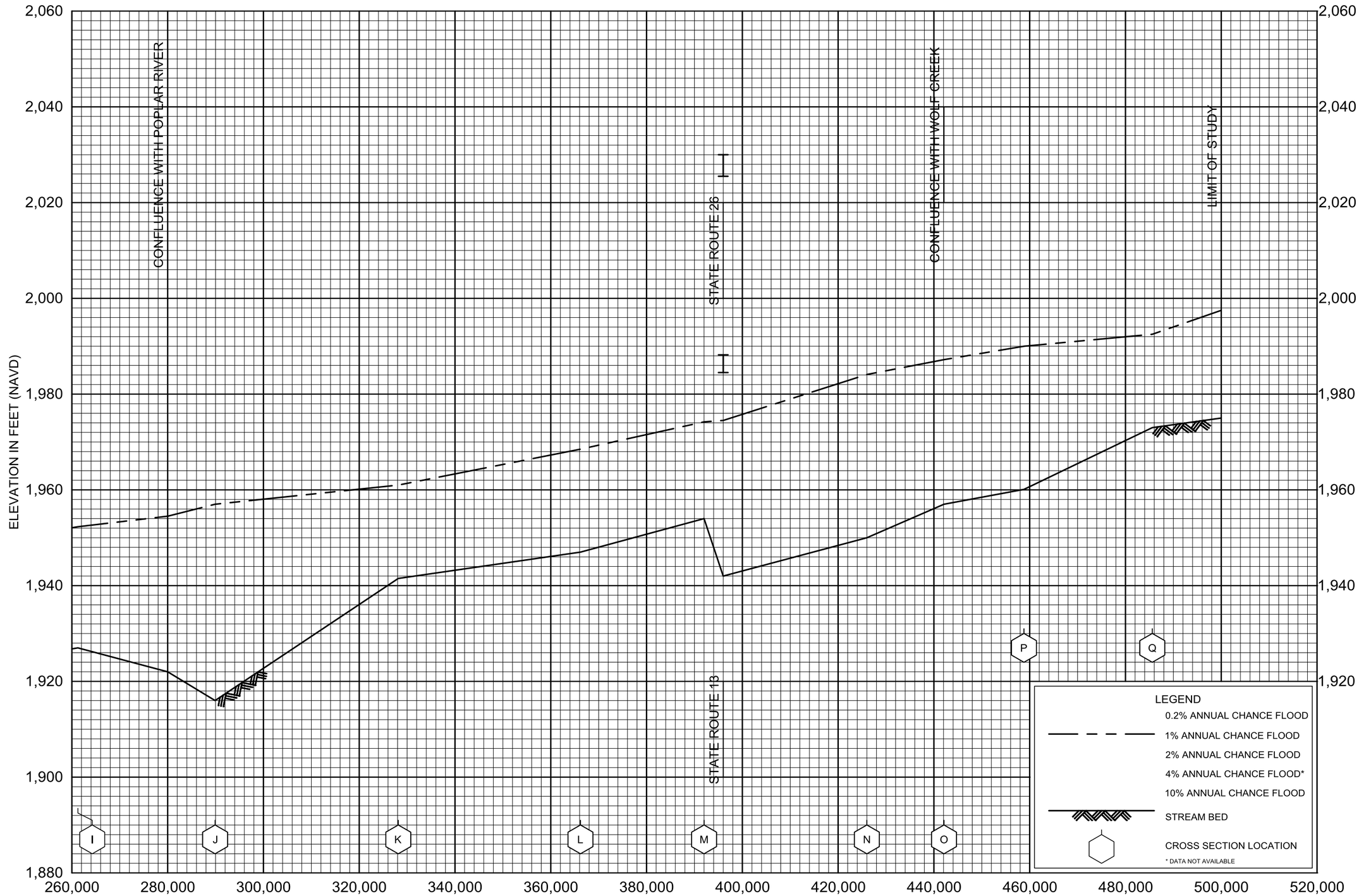

FLOOD PROFILES

MISSOURI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

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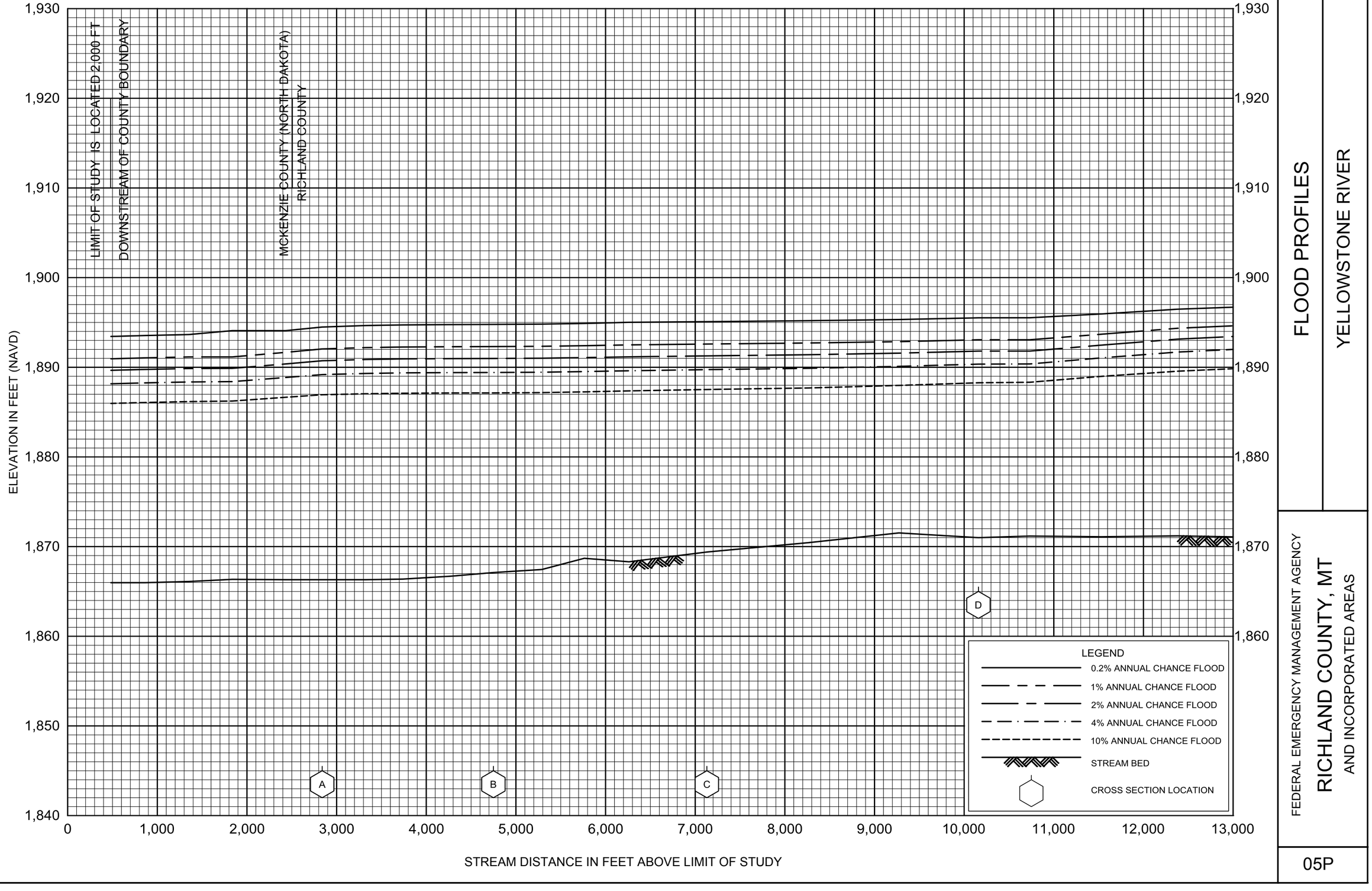

FLOOD PROFILES

YELLOWSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

05P

RICHLAND COUNTY

MCKENZIE COUNTY (NORTH DAKOTA)

ELEVATION IN FEET (NAVD)

1,940
1,930
1,920
1,910
1,900
1,890
1,880
1,870
1,860
1,850

13,000 14,000 15,000 16,000 17,000 18,000 19,000 20,000 21,000 22,000 23,000 24,000 25,000 26,000

STREAM DISTANCE IN FEET ABOVE LIMIT OF STUDY

E F G H I J

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 4% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

YELLOWSTONE RIVER

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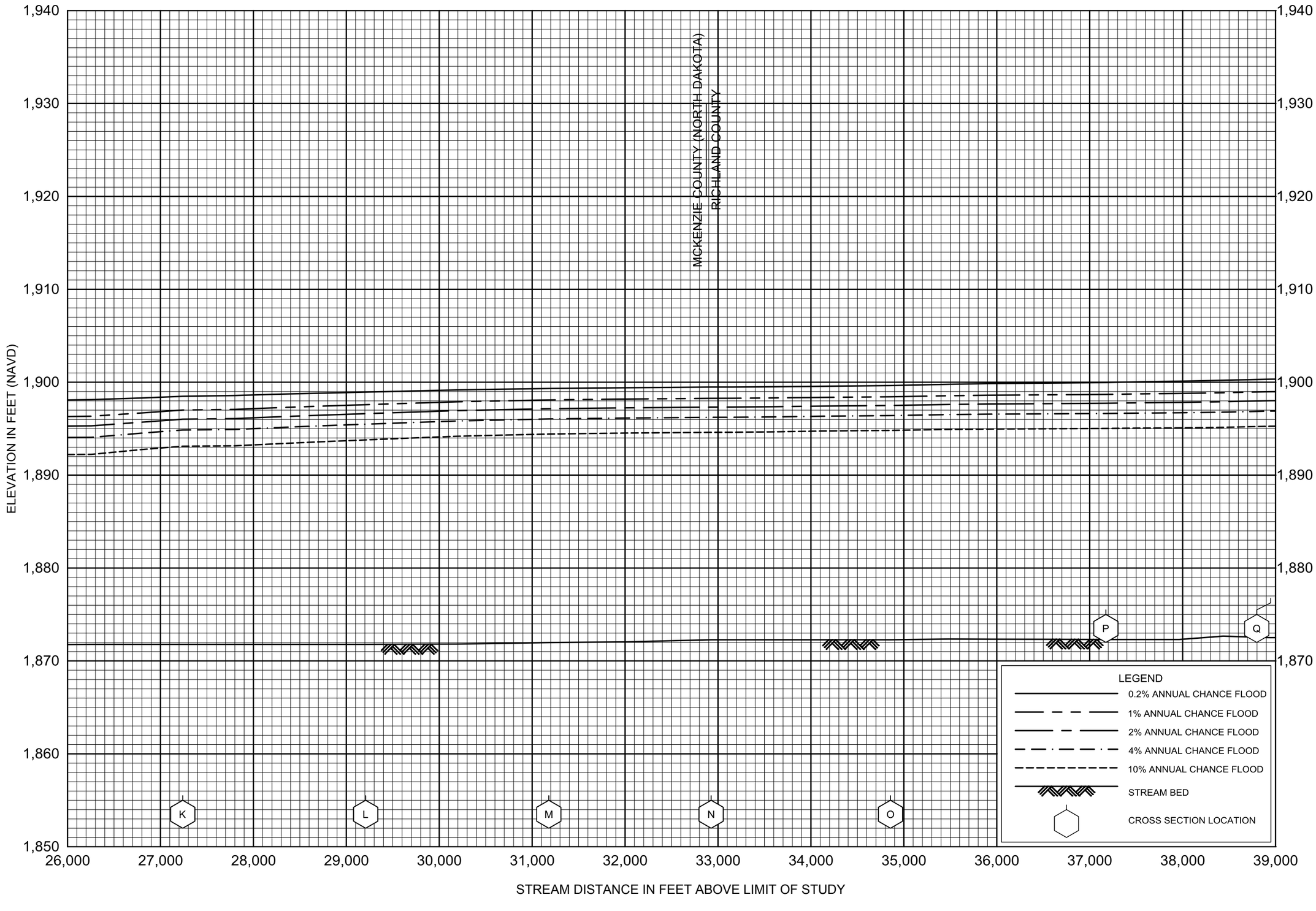
AND INCORPORATED AREAS



FLOOD PROFILES

YELLOWSTONE RIVER

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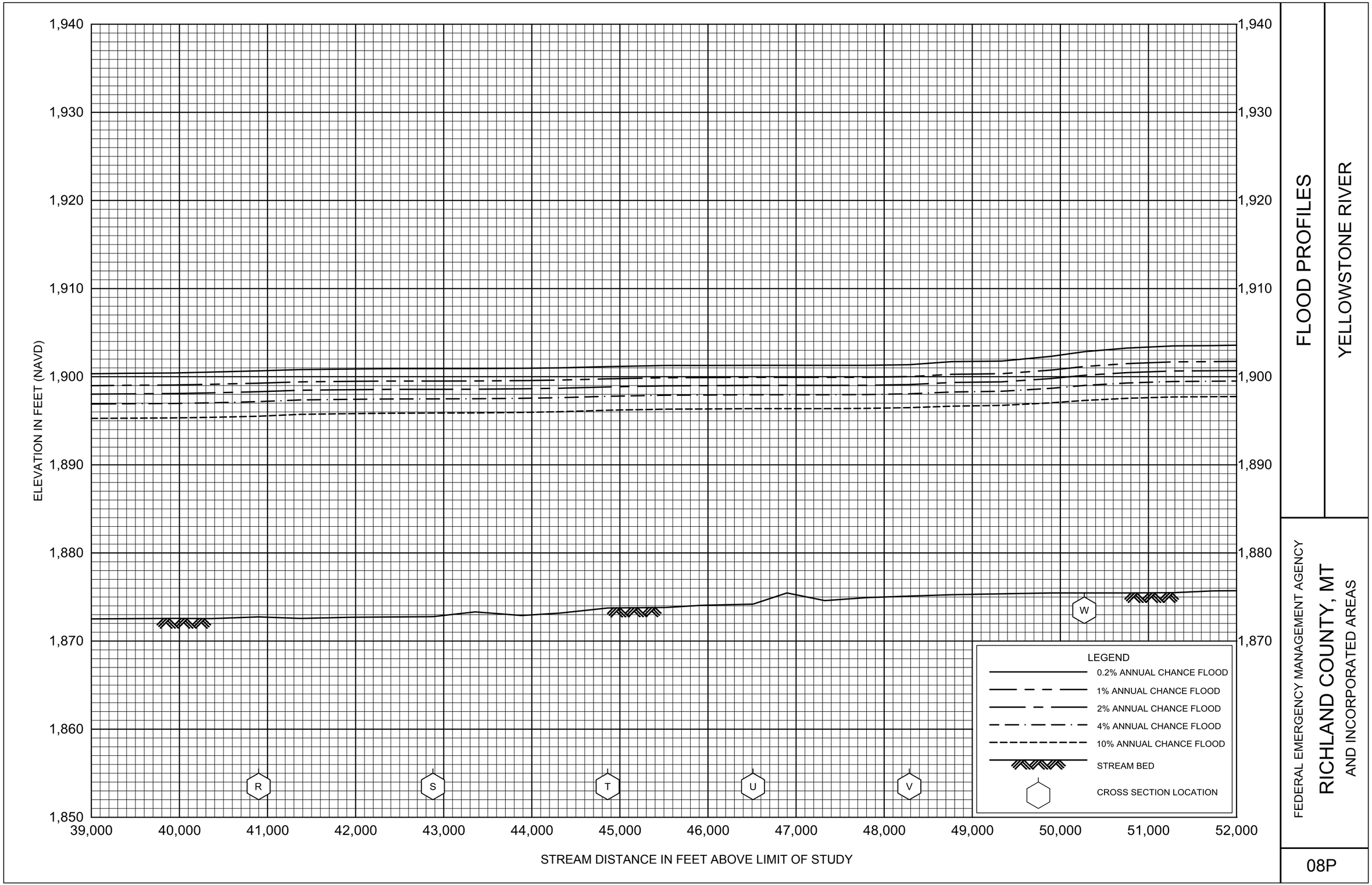

FLOOD PROFILES

YELLOWSTONE RIVER

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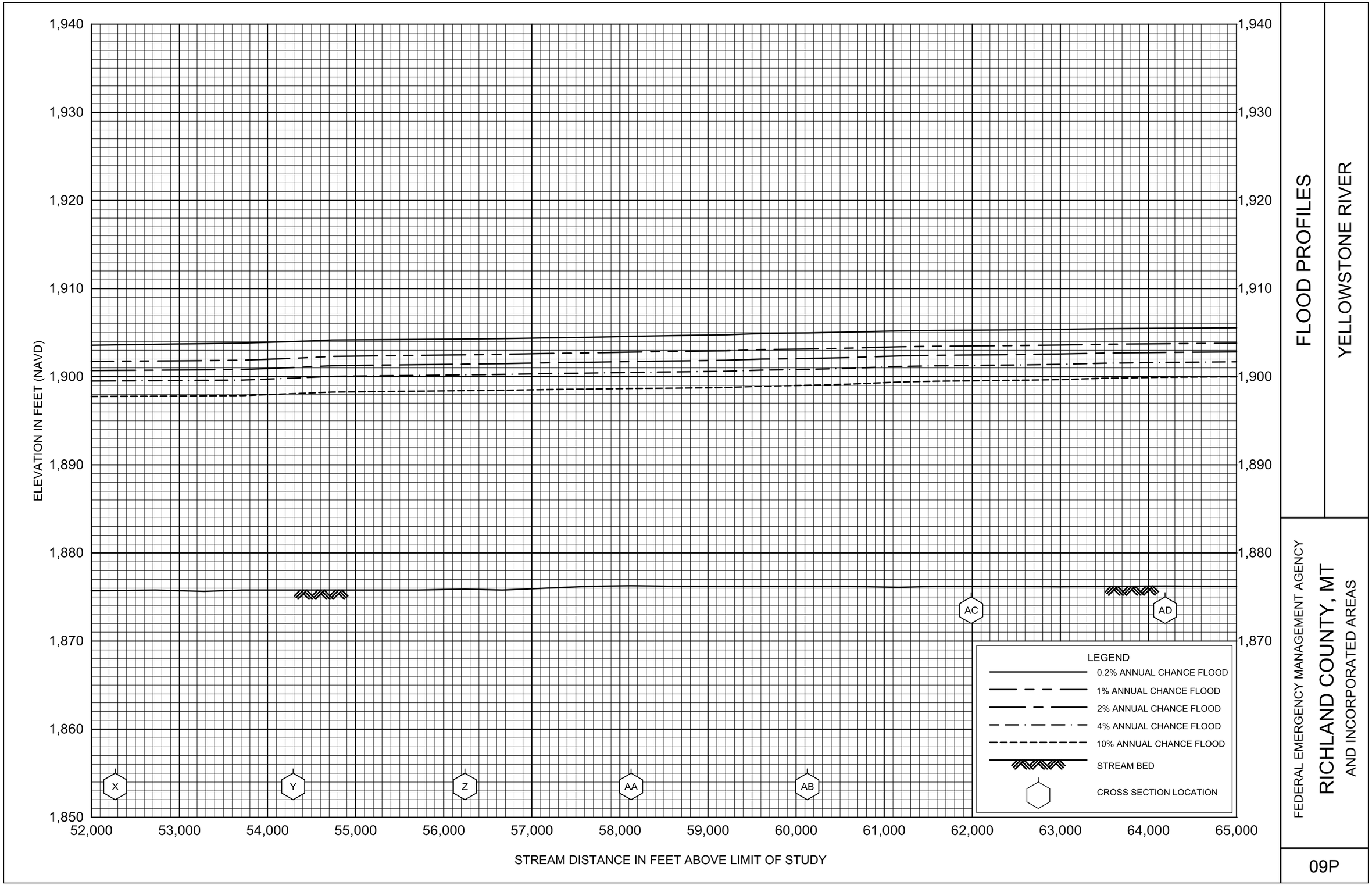

FLOOD PROFILES

YELLOWSTONE RIVER

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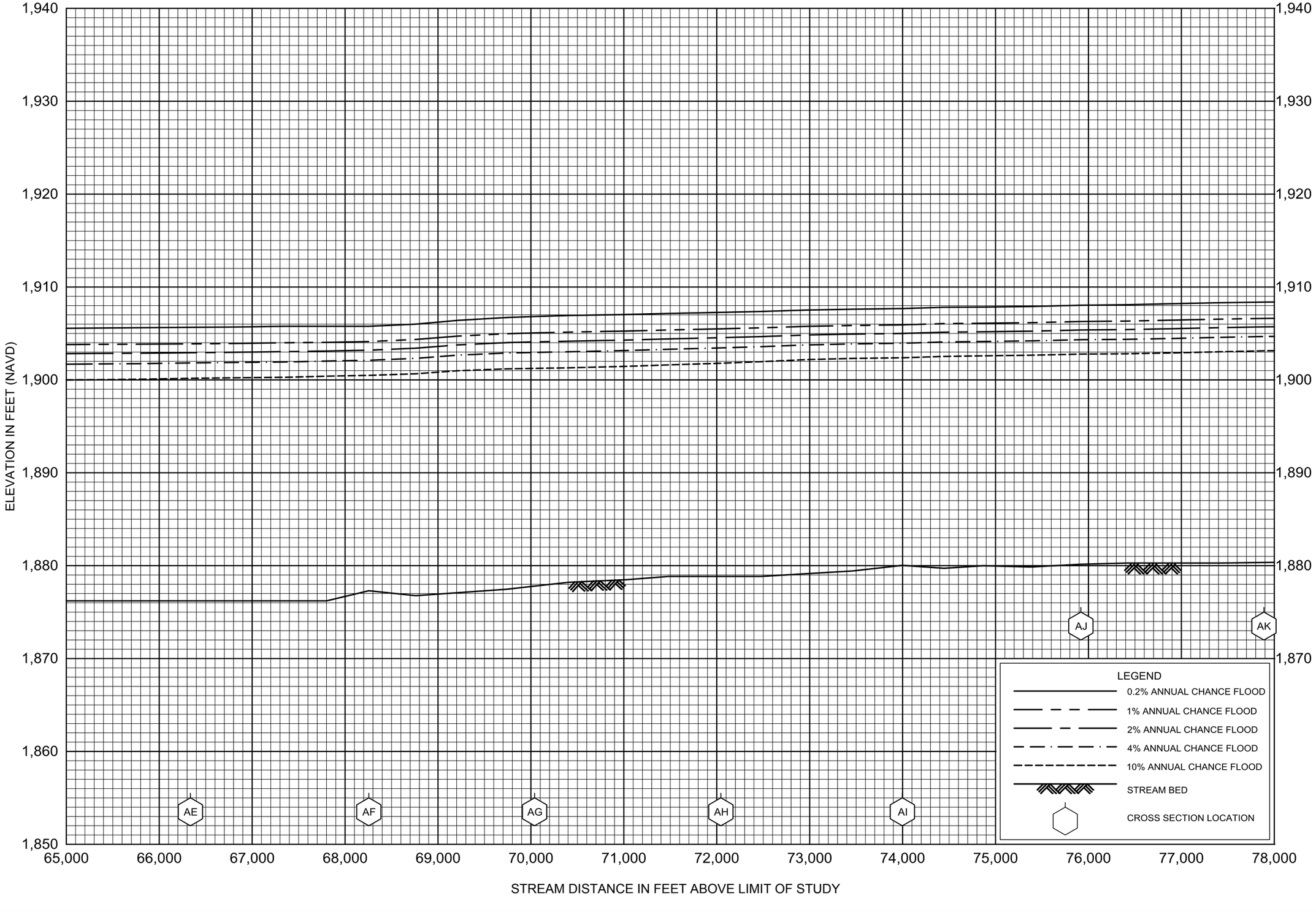

FLOOD PROFILES

YELLOWSTONE RIVER

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AND INCORPORATED AREAS

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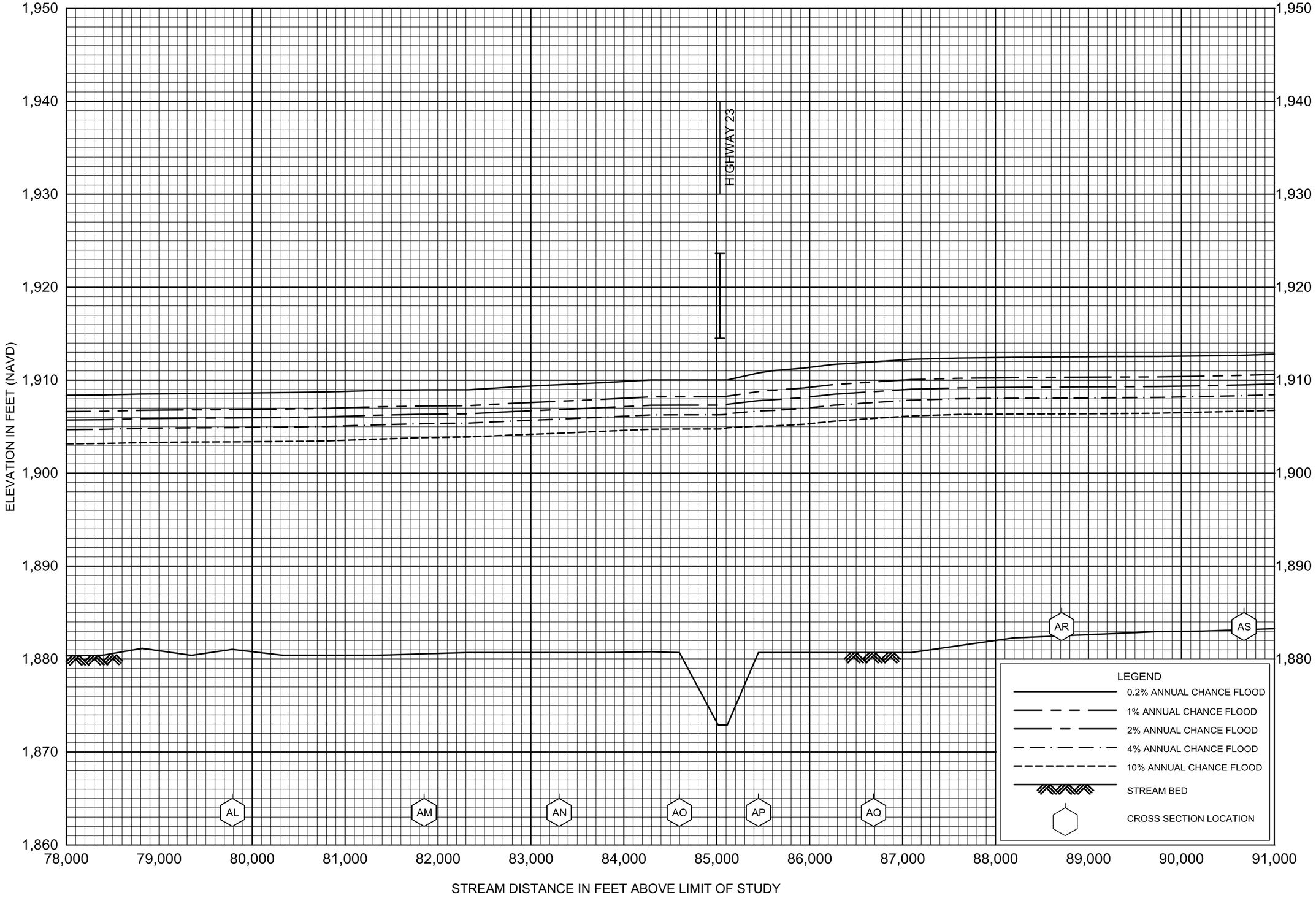

FLOOD PROFILES

YELLOWSTONE RIVER

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AND INCORPORATED AREAS

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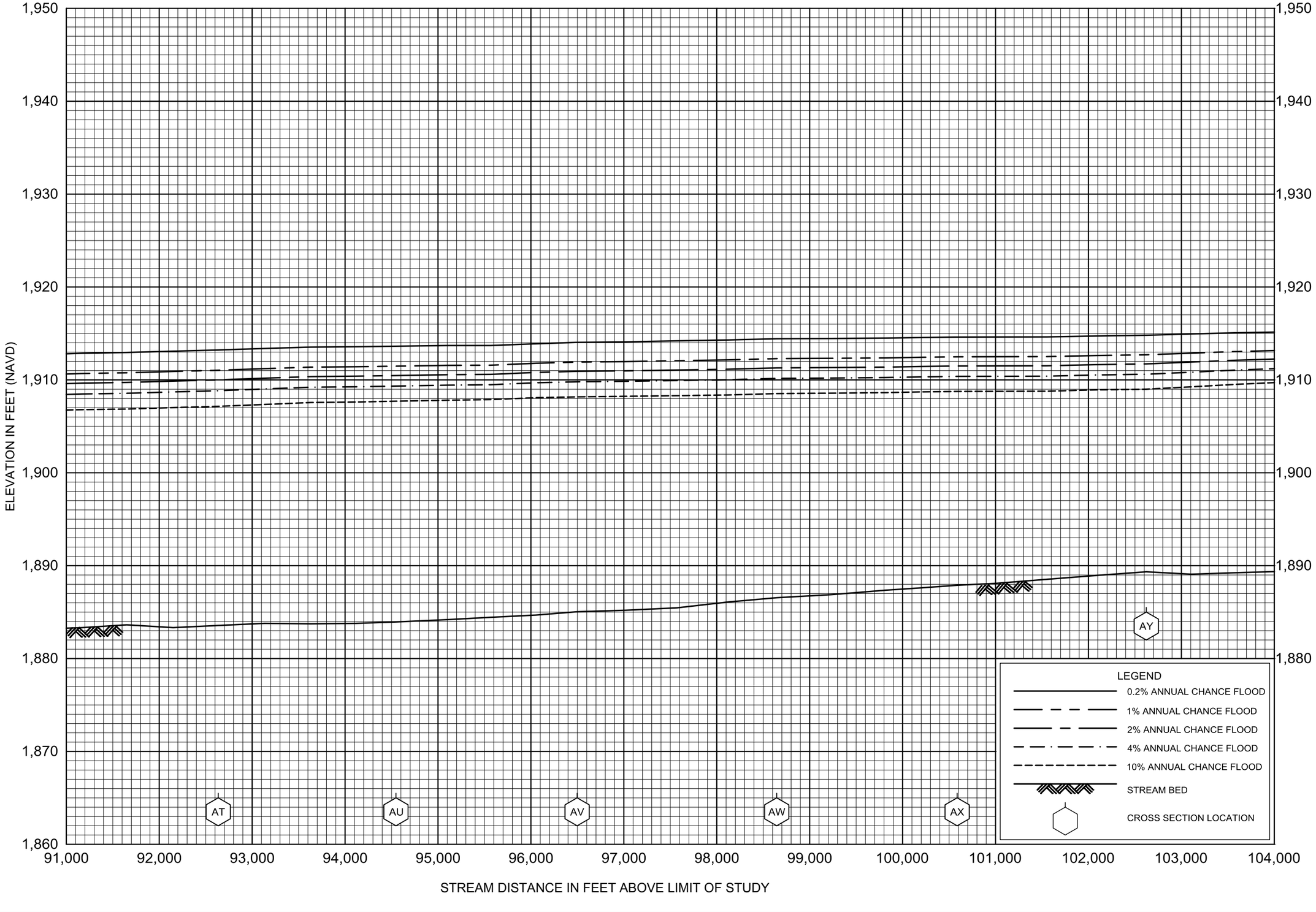

FLOOD PROFILES

YELLOWSTONE RIVER

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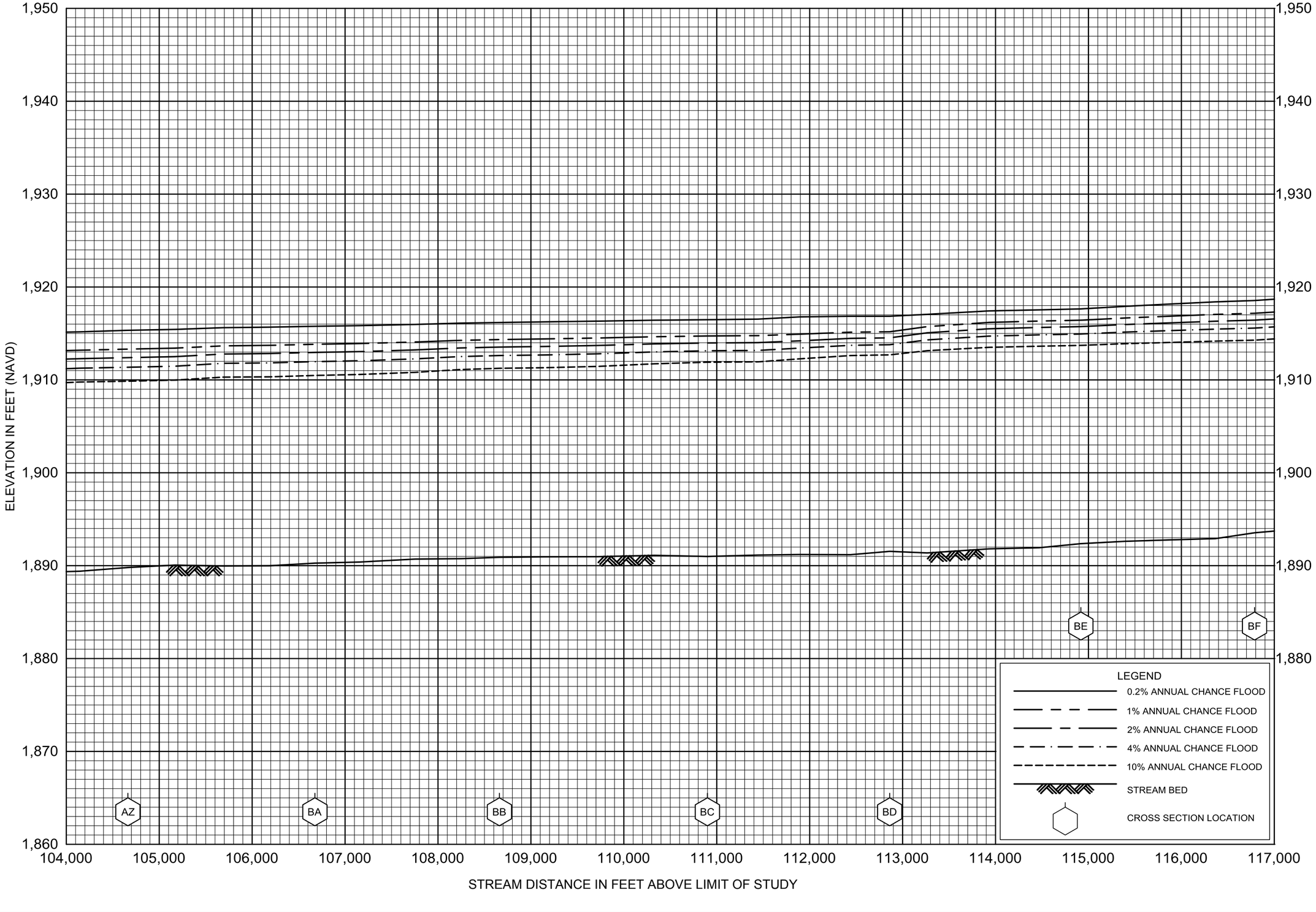

FLOOD PROFILES

YELLOWSTONE RIVER

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AND INCORPORATED AREAS

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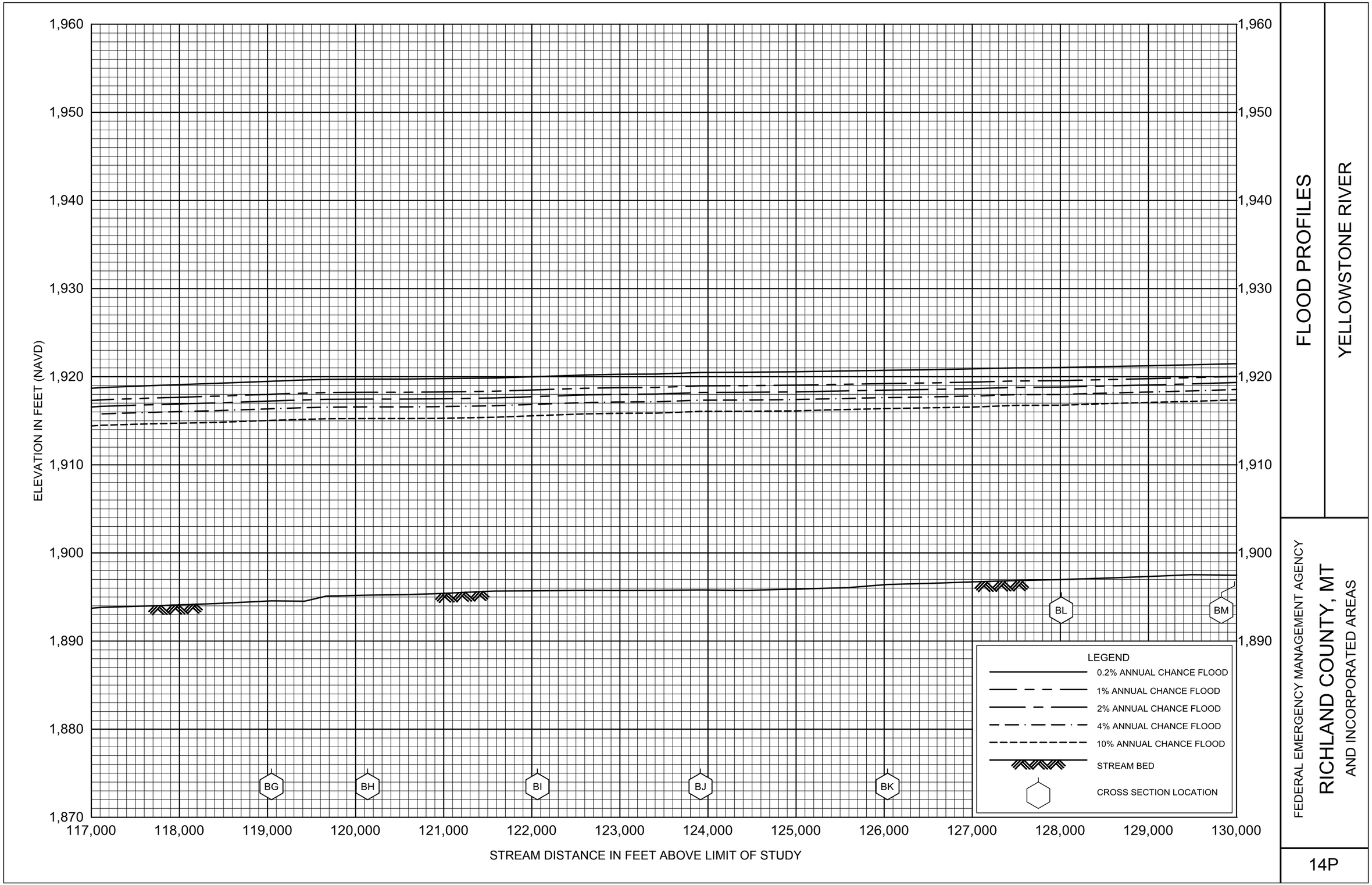

FLOOD PROFILES

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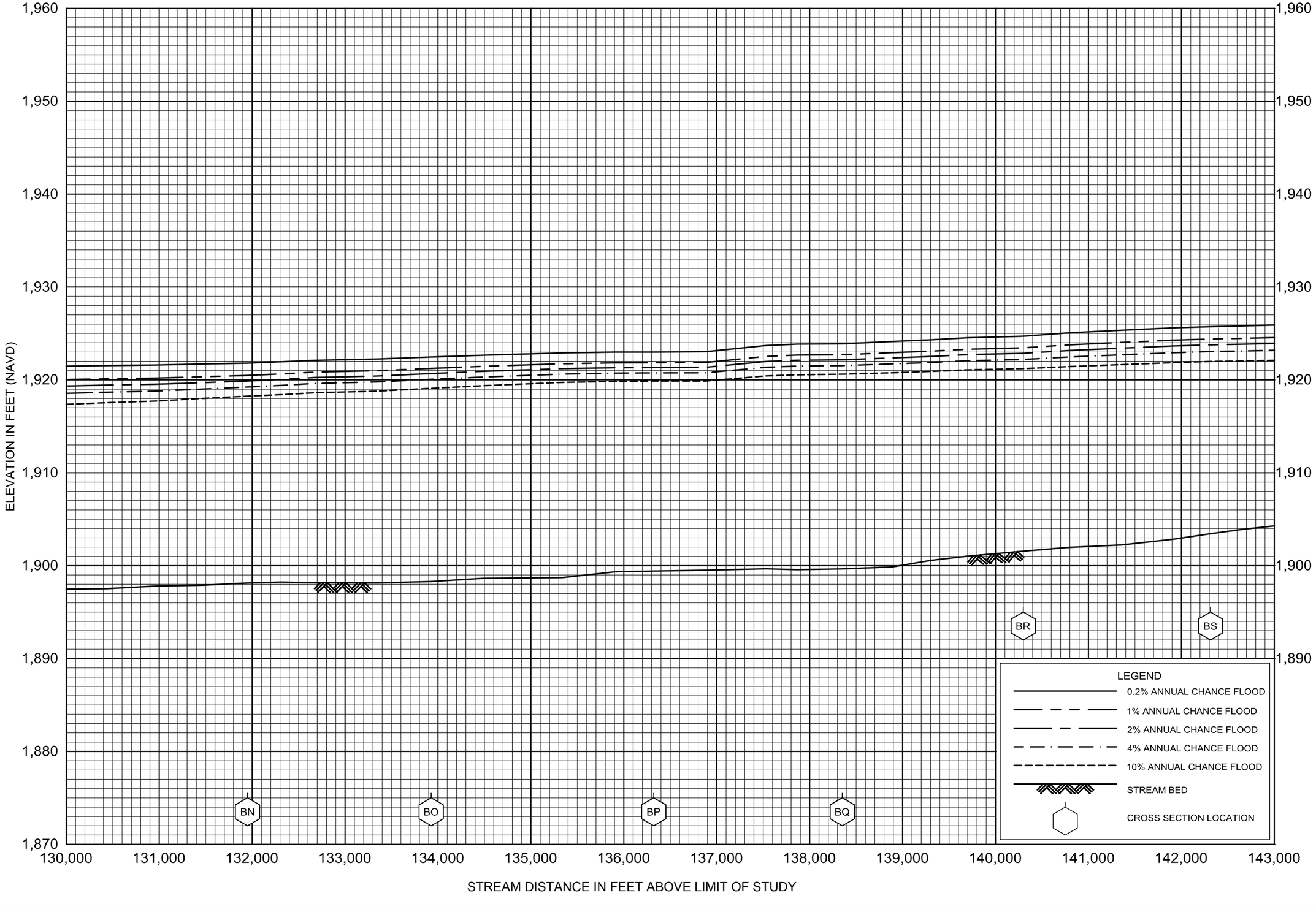

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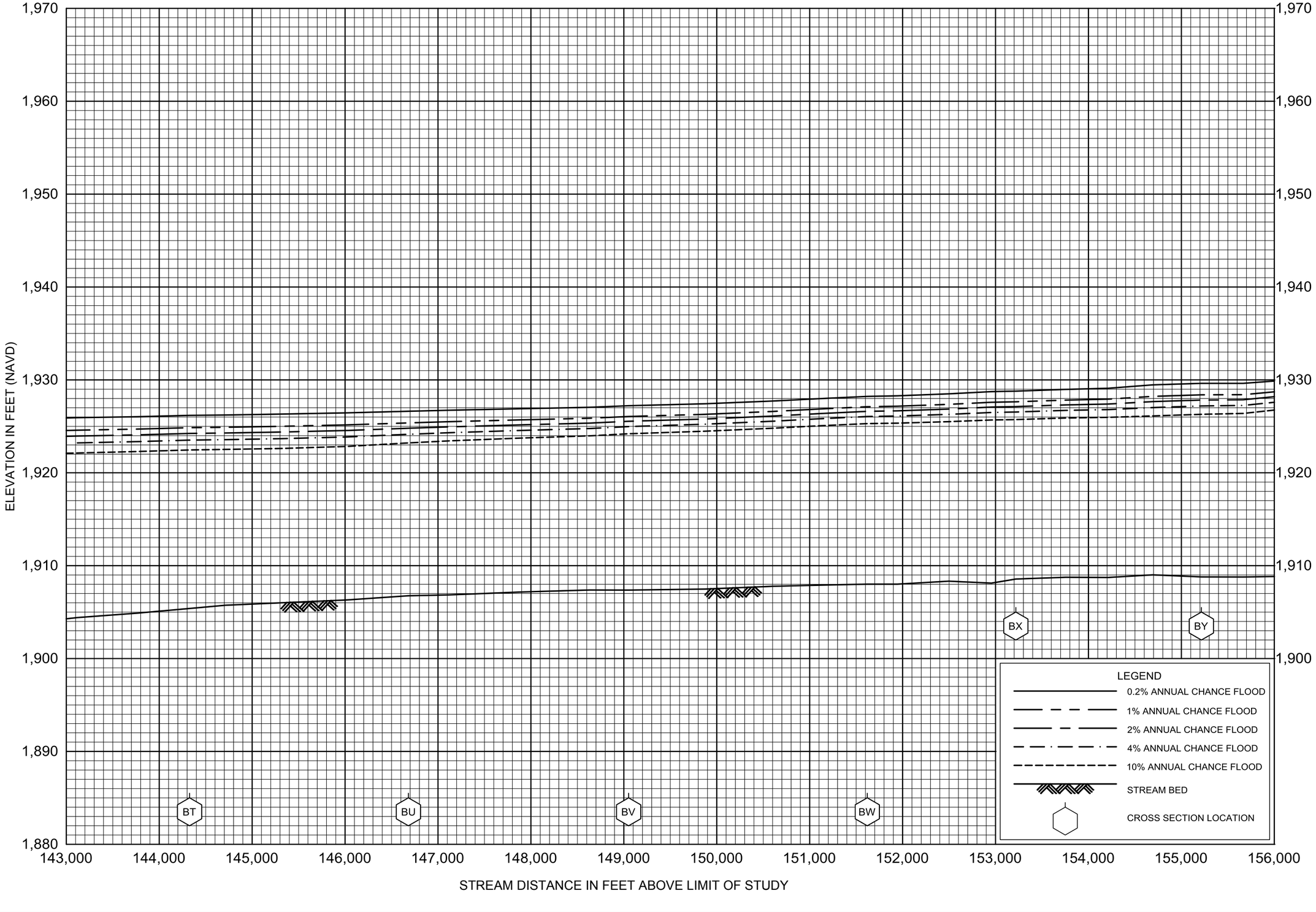
AND INCORPORATED AREAS



FLOOD PROFILES

YELLOWSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

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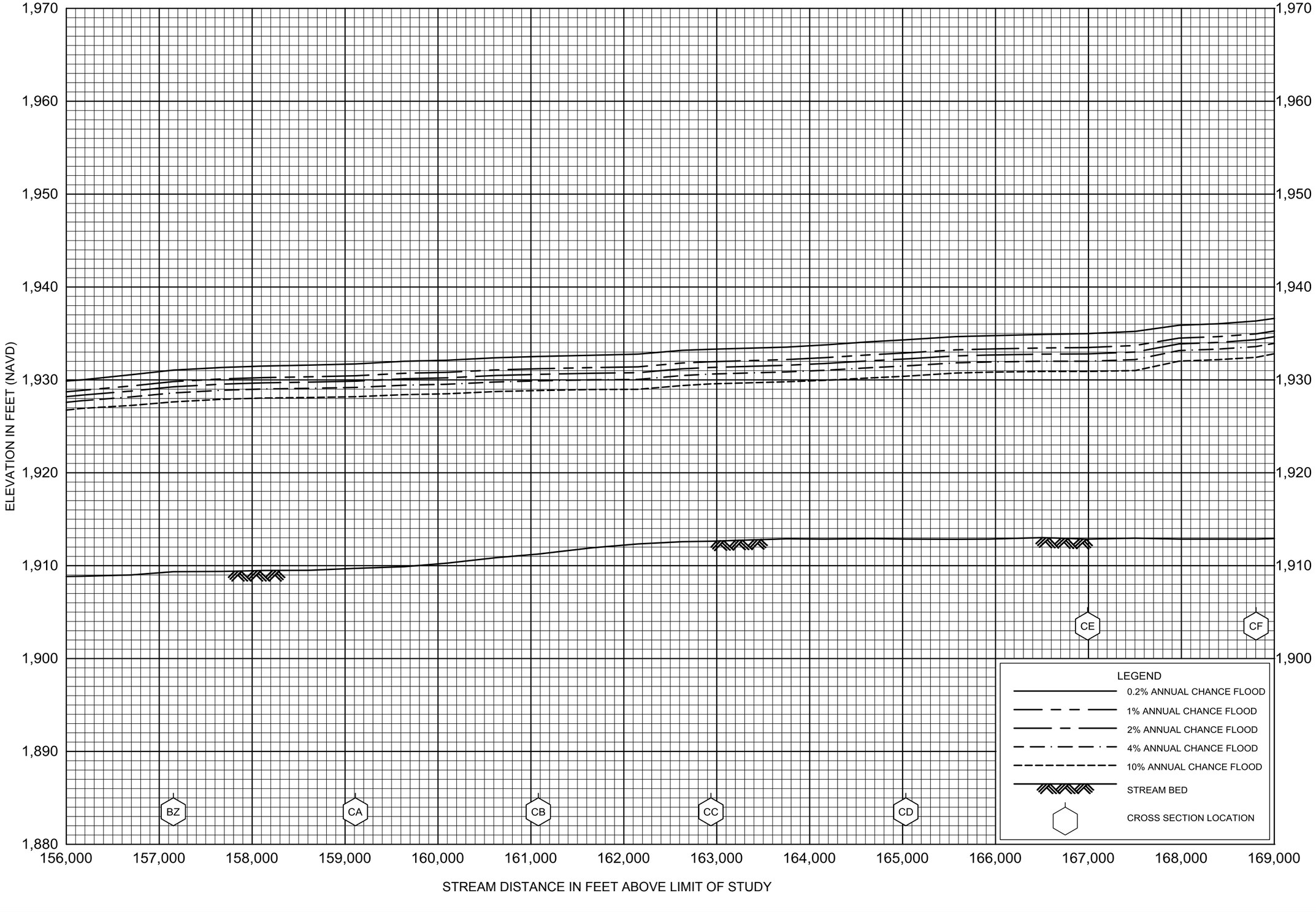

FLOOD PROFILES

YELLOWSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

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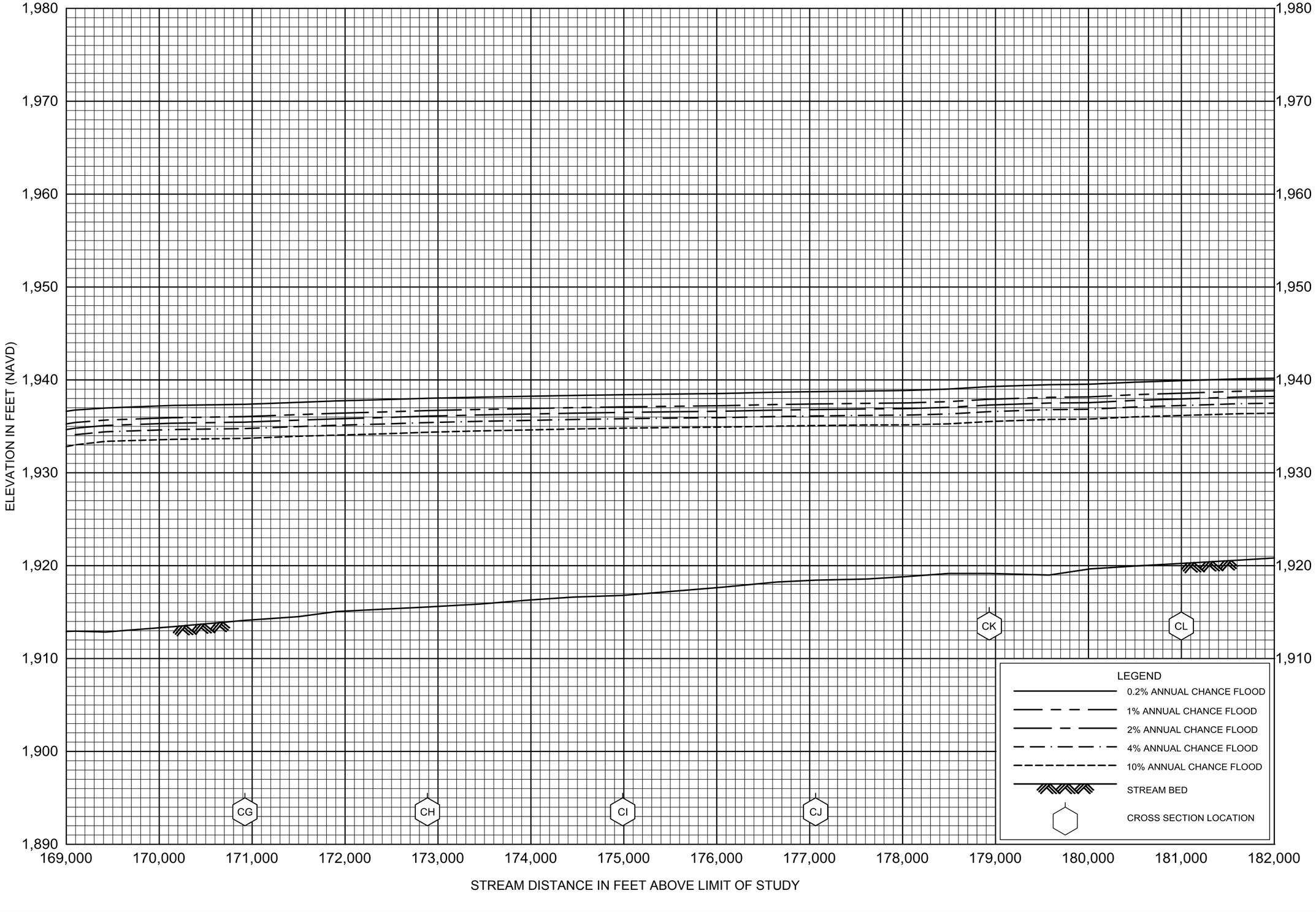


FLOOD PROFILES

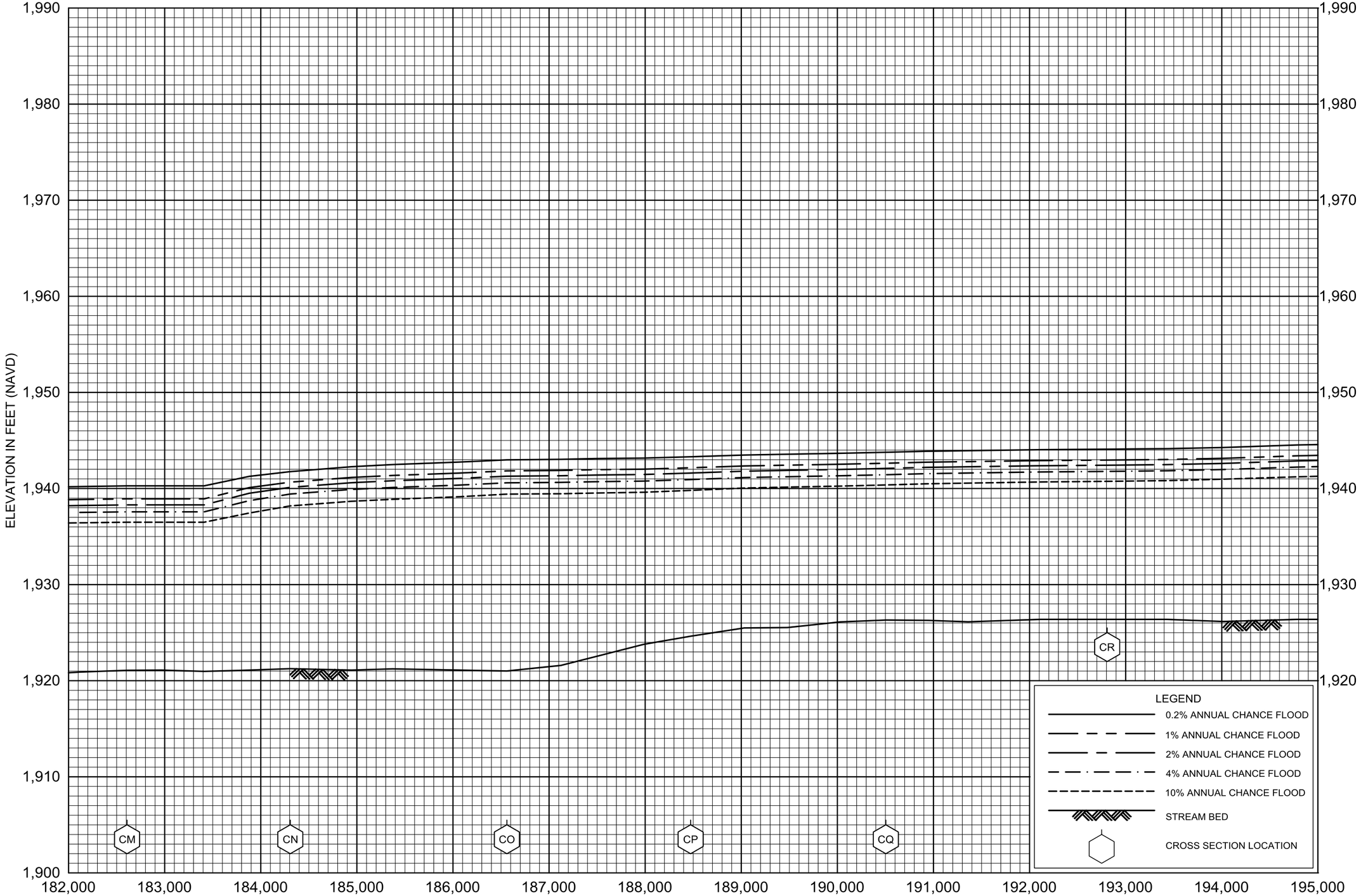
YELLOWSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

18P



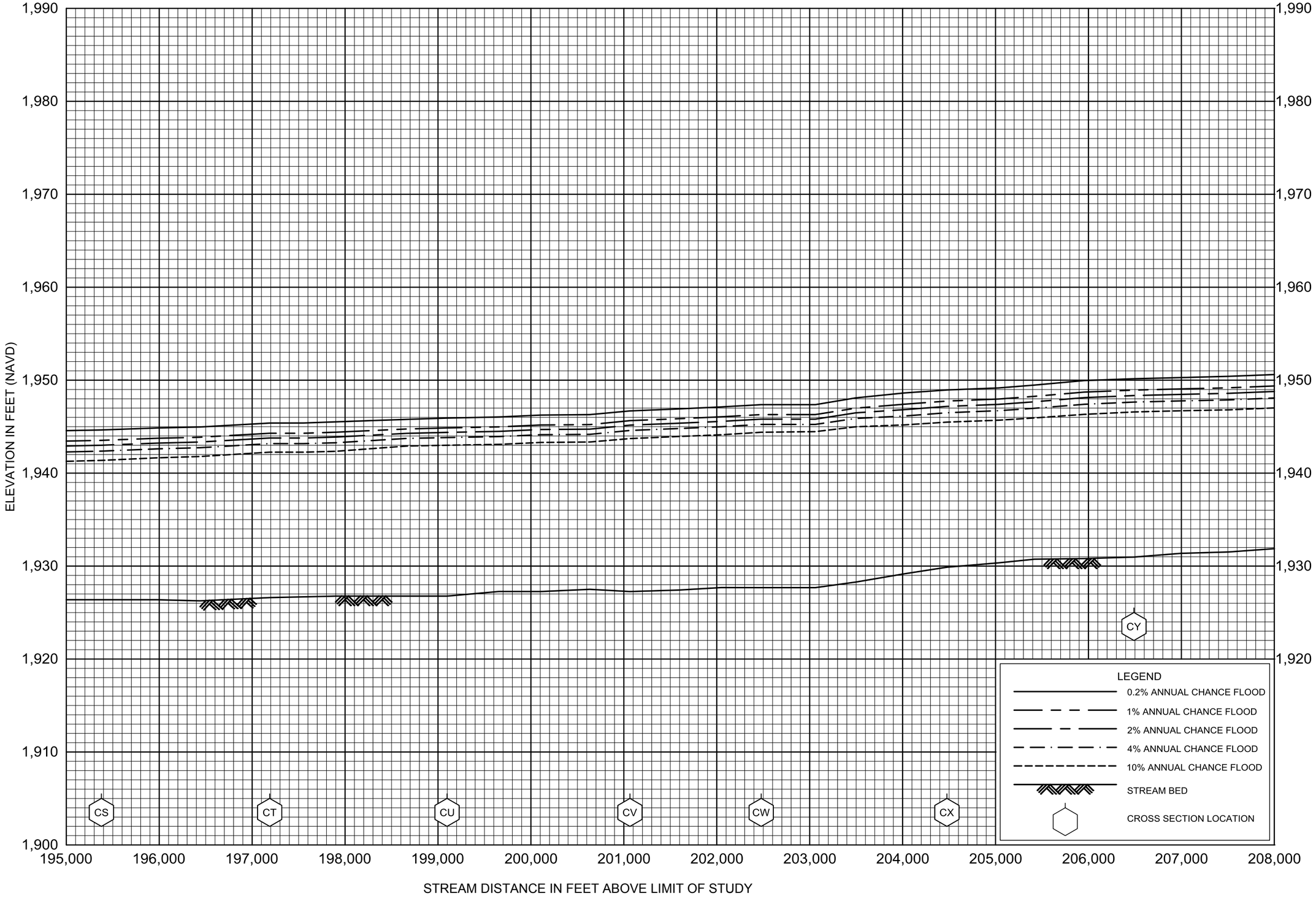
FLOOD PROFILES

YELLOWSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS



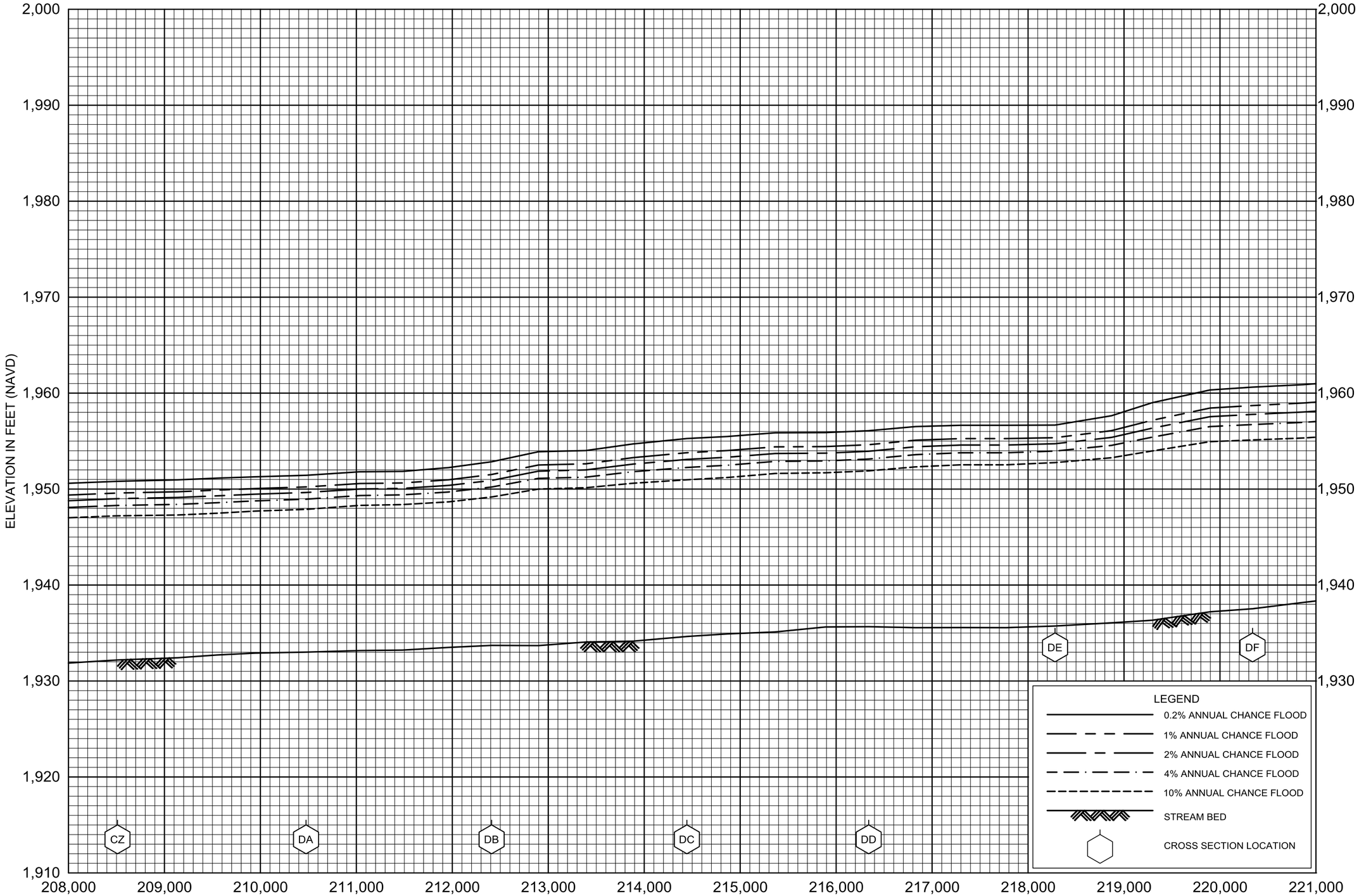
FLOOD PROFILES

YELLOWSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS



FLOOD PROFILES

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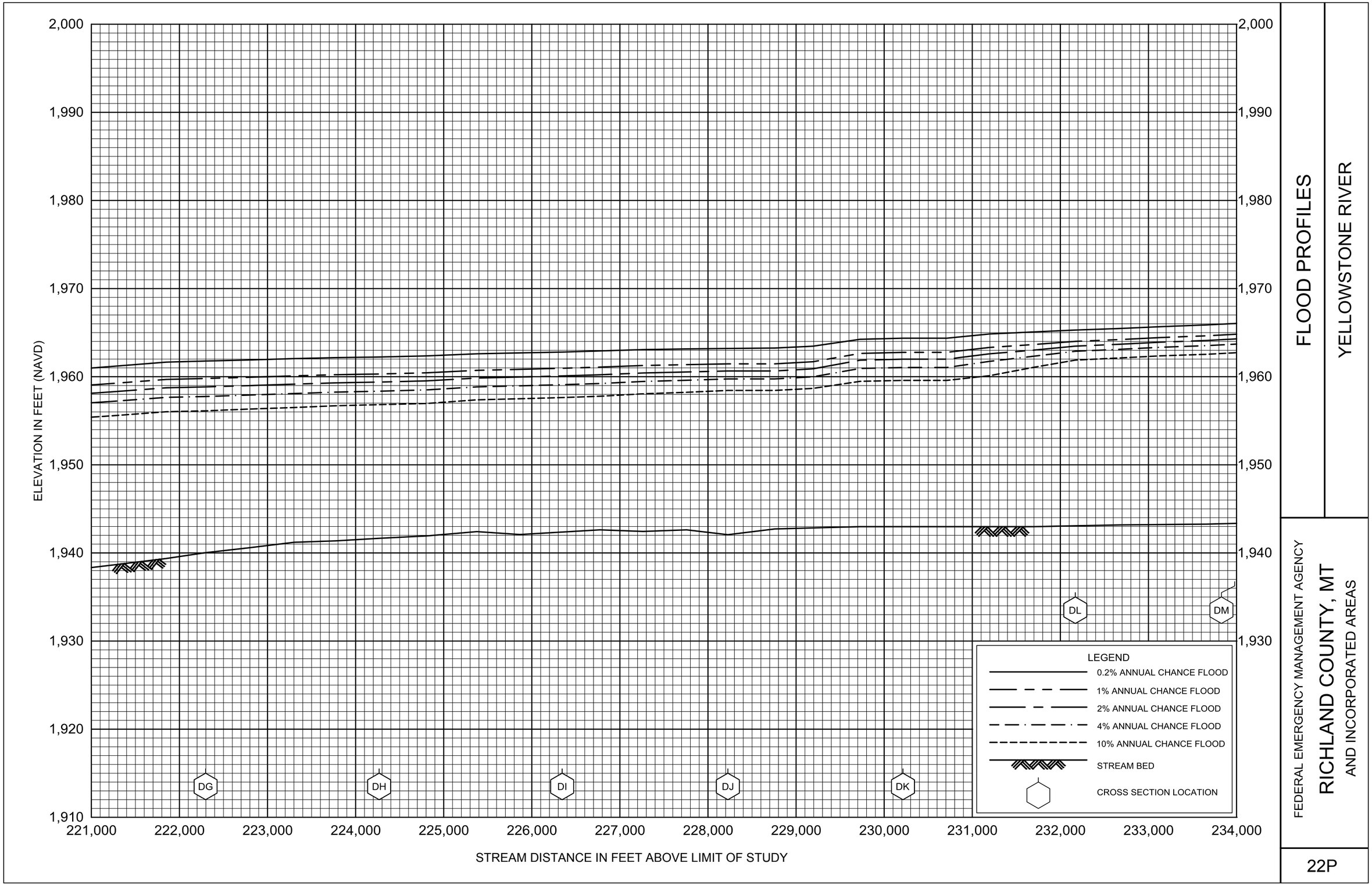

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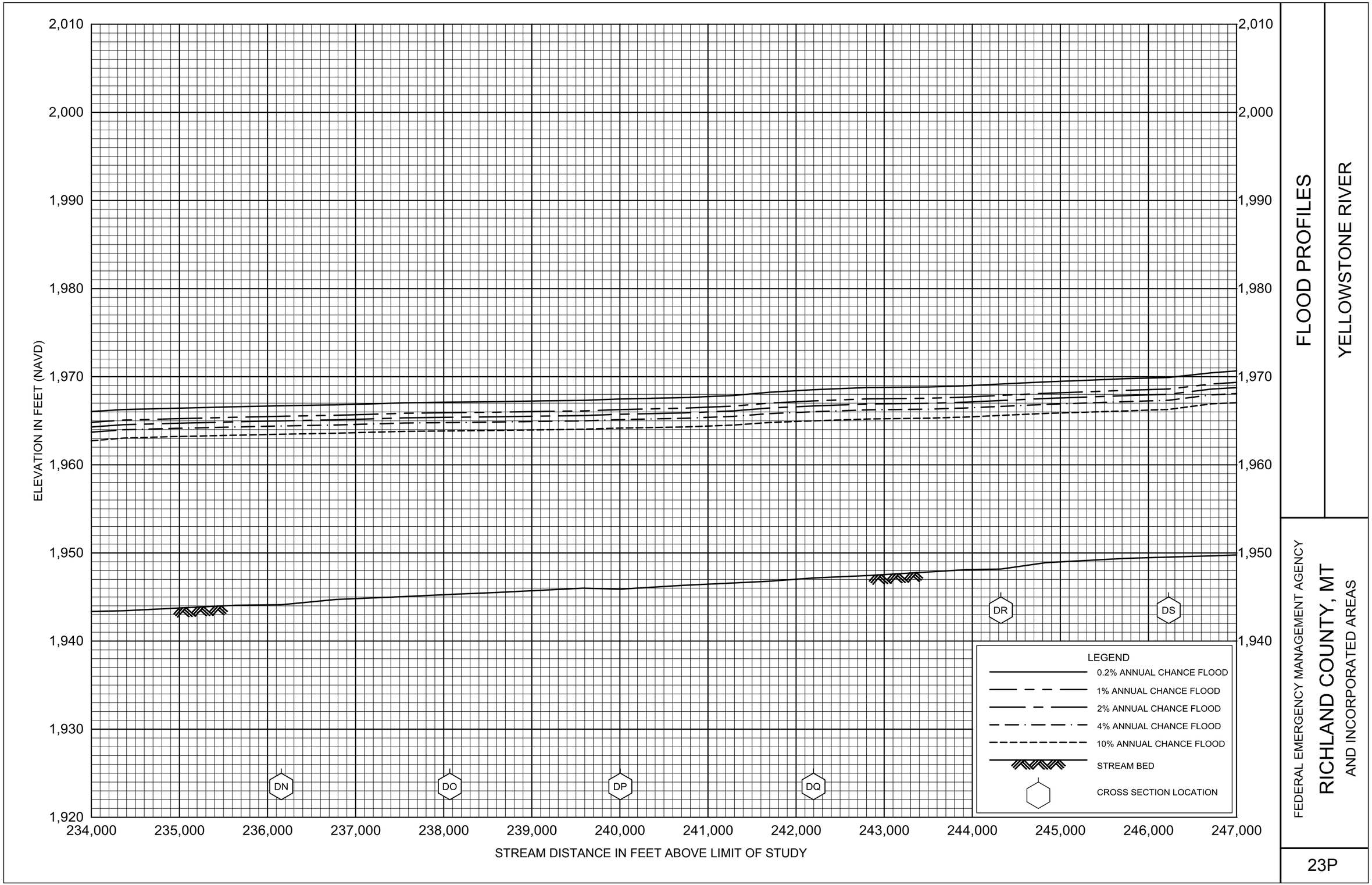

FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

AND INCORPORATED AREAS

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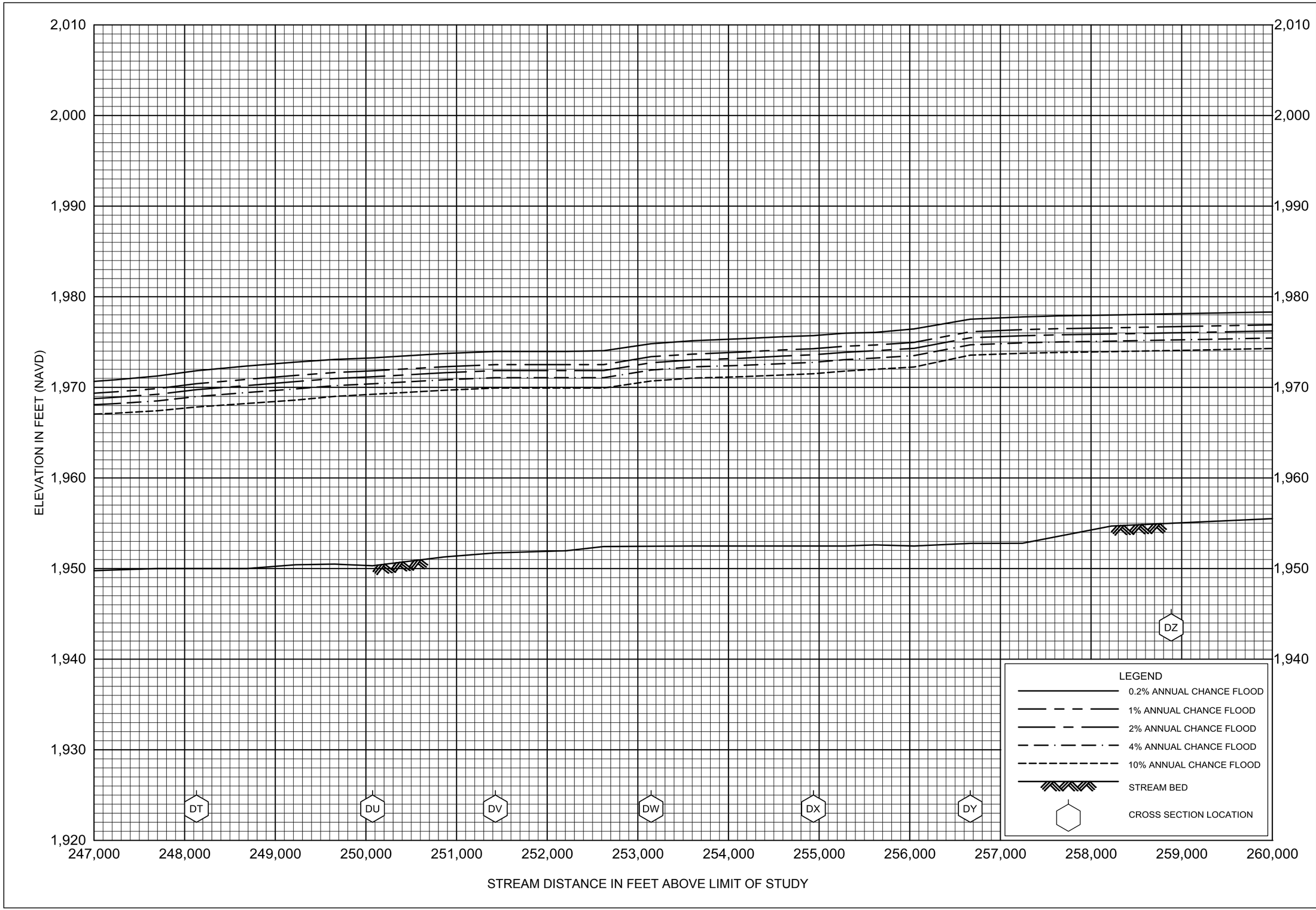

FLOOD PROFILES

YELLOWSTONE RIVER

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RICHLAND COUNTY, MT

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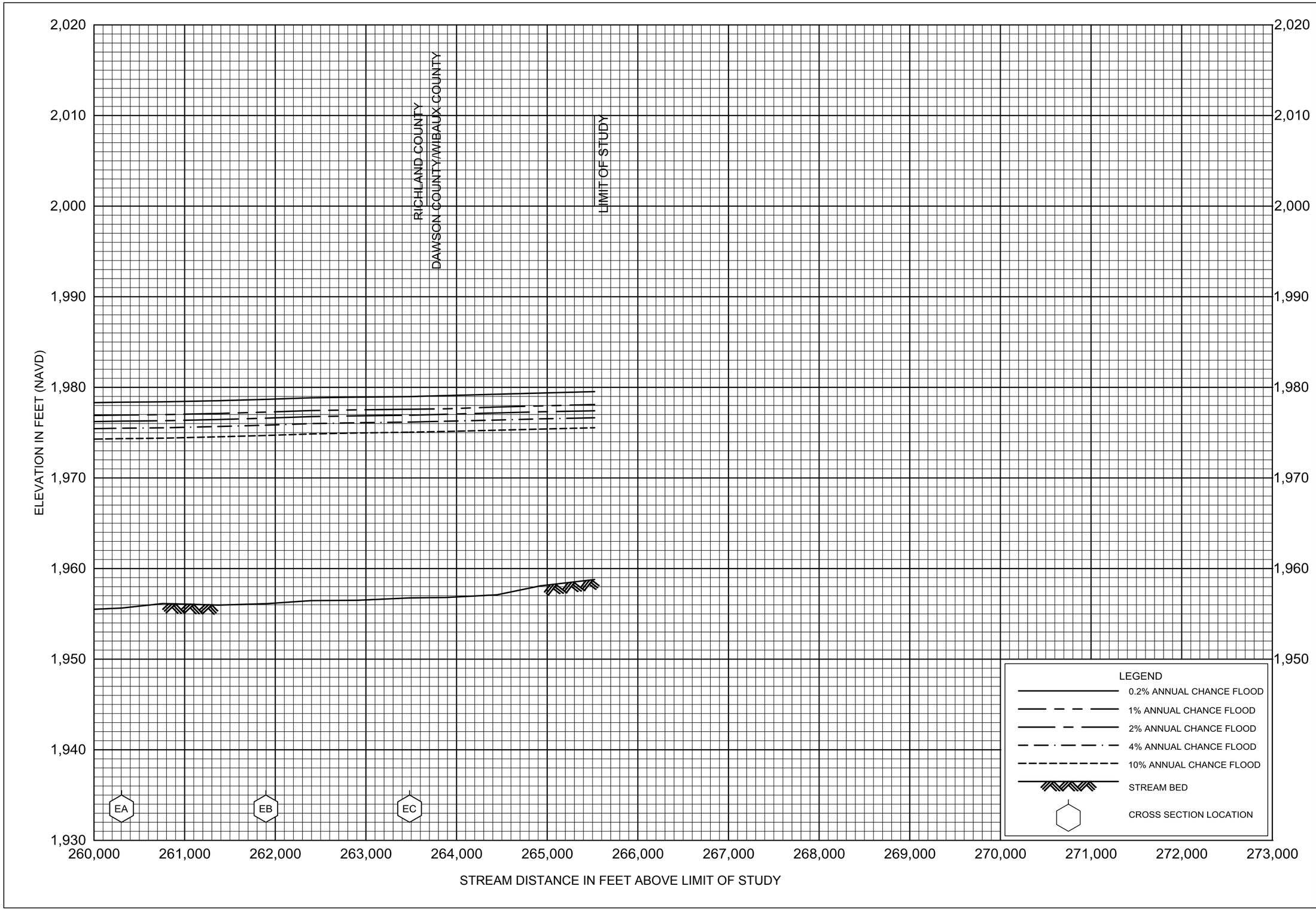

FLOOD PROFILES

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FEDERAL EMERGENCY MANAGEMENT AGENCY

RICHLAND COUNTY, MT

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